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# SOIL MANAGEMENT GUIDE

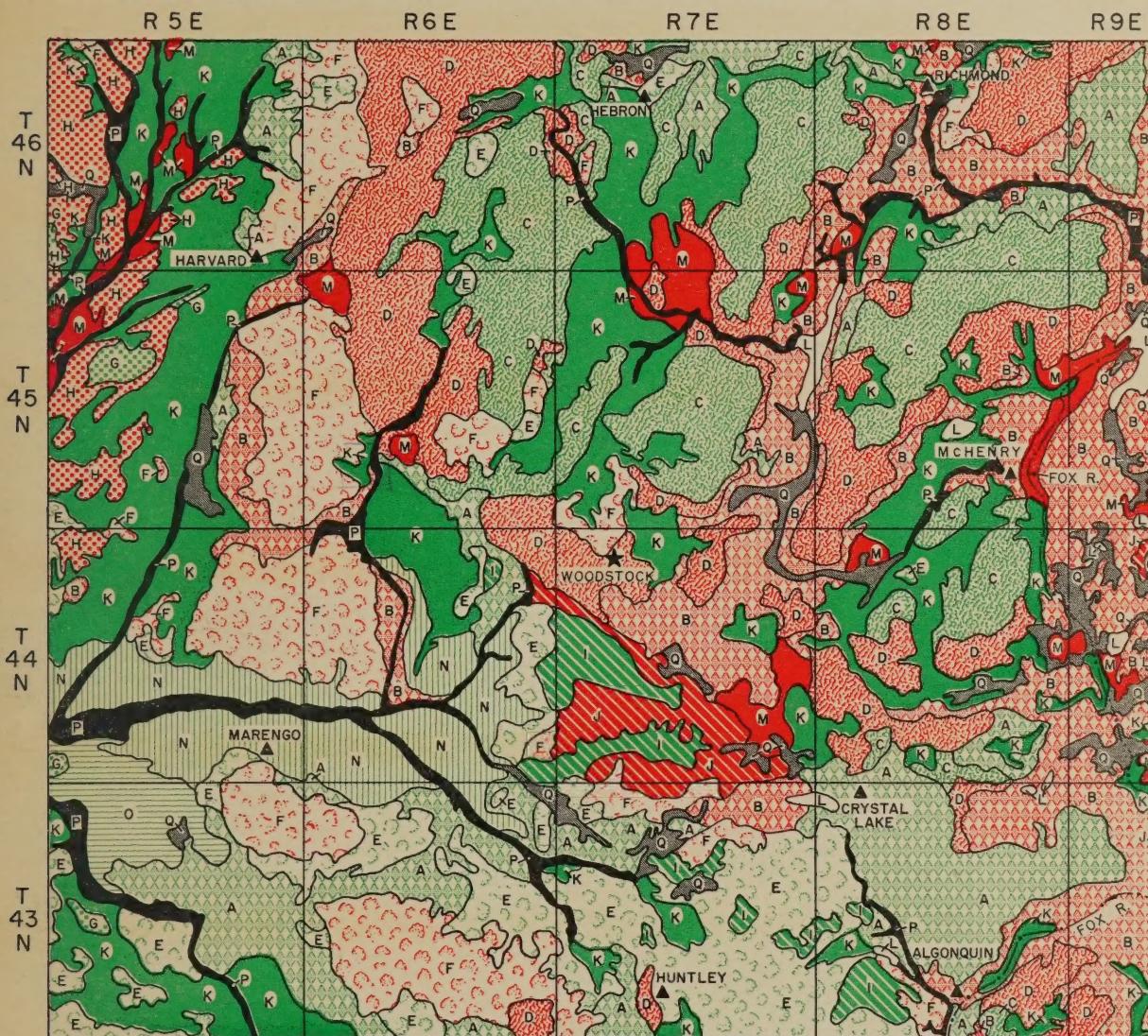
## McHENRY COUNTY, ILLINOIS

YOUR PERSONAL GUIDE TO BETTER UNDERSTAND AND MANAGE YOUR SOILS

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### BROAD SOIL ASSOCIATIONS IN McHENRY COUNTY

AUG 2 1962



#### LEGEND

FOR DESCRIPTIONS OF SOIL ASSOCIATIONS SEE PART II IN FOLDER



A	WARSAW-LORENZO	G	DANA-SIDELL	N	LOMAX-VOLINIA
B	FOX-CASCO	H	XENIA-RUSSELL	O	SUMNER-SELMA
C	RINGWOOD-GRISWOLD	I	ELLIOTT-VARNA	P	OTTER-MILLINGTON
D	MCHENRY-LAPEER	J	BLOUNT-MORLEY	Q	HOUGHTON-LENA
E	SAYBROOK-LAROSE	K	BRENTON-PROCTOR	L	LAKE
F	MIAMI-STRAWN	M	STARKS-CAMDEN		FOX RIVER

A SOIL MAP OF YOUR FARM IS INSIDE OF THE FRONT COVER. YOUR SOILS  
ARE DESCRIBED AND THEIR PROPER MANAGEMENT DISCUSSED ON THE ENCLOSED SHEETS

UNIVERSITY OF ILLINOIS AGR. EXP. STA. EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS  
IN CO-OPERATION WITH U.S.D.A. SOIL CONSERVATION SERVICE

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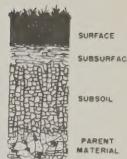


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SCALE IN FEET

# McHENRY COUNTY SOIL MANAGEMENT GUIDE\*

## PART 1 HOW TO USE THE SOIL MAP AND MANAGEMENT RECOMMENDATIONS



The material in this folder has been prepared to help you become familiar with the soils on your farm and to manage them for maximum returns and sustained productivity.

### EXAMINE THE SOIL MAP

The first step in using this report is to examine the soil map of your farm. It shows the location and extent of the different soil types, the slope of the land on which they occur, and the depth to subsoil or degree of erosion. These things are indicated by symbols consisting of three parts, arranged either horizontally (as 310 B 1) or vertically (as  $\overline{310}$  B  $\overline{1}$ ). The symbols have the following meanings:

310 → The *first number* indicates the soil type. In the example given here, 310 refers to McHenry silt loam. Sometimes there is a bar over the soil type number (for example,  $\overline{103}$ ). This indicates that the area is usually too wet for cultivated crops.

The *letter* in the center of the symbol indicates the average slope of the area. The slope groups are as follows:

A = 0 to 1.5 percent slope	D = 7 to 12 percent slope
B → B = 1.5 to 4 percent slope	E = 12 to 18 percent slope
C = 4 to 7 percent slope	F = More than 18 percent slope

Percent of slope refers to the number of feet of fall in each 100 feet of horizontal distance. For example, a 2-percent slope has 2 feet of fall in 100 horizontal feet.

In some areas the letter K is inserted between the soil type number and the slope letter (for example, 361 K D 3) to indicate a complex slope pattern (kame and kettle topography).

The *last number* or + sign (or signs) in the symbol indicates depth to subsoil or degree of erosion. These letters and signs have the following meanings:

+ = 8 to 20 inches of recently deposited, light-colored soil material over the natural soil surface.
++ = 8 to 20 inches of recently deposited, dark-colored soil material over the natural soil surface.
0 = Depth to subsoil more than 14 inches. No apparent erosion or recent deposition.
1 → 1 = Depth to subsoil usually between 7 and 14 inches. Slight erosion.
2 = Depth to subsoil usually between 3 and 7 inches. Plow layer is a mixture of surface and subsoil. Moderate erosion.
3 = Depth to subsoil usually between 0 and 3 inches with the plow layer composed primarily of subsoil. Severe erosion.
4 = Gullied area. Very severe erosion.

On soils that normally have no subsoil the number refers to depth of surface soil only.

\*The soils of McHenry County, Illinois, were mapped by B. W. Ray (in charge), A. H. Reimer, C. A. Skimina, and P. T. Veale, University of Illinois Agricultural Experiment Station; and D. C. Hallbick, E. G. Holhubner, R. L. Newbury, and L. H. Pierard, Soil Conservation Service, U. S. Department of Agriculture.

This publication was prepared by B. W. Ray, University of Illinois, Agricultural Experiment Station and D. C. Hallbick, Soil Conservation Service, U. S. Department of Agriculture.

Helpful suggestions were received from many members of the University of Illinois Agricultural Experiment Station and the Soil Conservation Service, U. S. Department of Agriculture.

## STUDY "USE AND MANAGEMENT" SHEETS

After learning what soil types occur on your farm, turn to the "Use and Management" sheets. The soil type numbers, as well as soil types names, are placed in the upper left-hand corner of each sheet.

Note that the soils differ in color, texture, depth, drainage, acidity, relief, and other characteristics. Some soils, however, are enough alike that they can be used and managed in much the same way. They are, therefore, grouped together for the use and management suggestions.

Recommended practices are based not only on the soil type but also on the slope of the land and the degree of erosion. The use and management of soils within each group may vary widely according to these factors. Therefore, it is important to keep in mind the symbols which indicate how much your land slopes and how much topsoil remains.

On many farms the soil pattern is very complex. Soils may occur side-by-side which are greatly different from each other and for which management suggestions are likewise quite different. A careful study of the soil map and sheets will help you decide on the best use and management for these problem areas of extreme soil variability.

### PLAN YOUR PROGRAM

The next step, after reading the use and management recommendations, is to plan an efficient program of land use and soil management for your farm. Your farm adviser or the personnel of your soil conservation district will be glad to help you. In developing your plan, remember these aspects of good management: adequate drainage; testing for soil acidity, phosphorus, and potassium; application of limestone and fertilizers; protection against erosion; and good tillage practices. *Keep your plan well-balanced, giving proper attention to each of the above aspects of soil management.* Do not emphasize one of the points and neglect others. On most farms livestock enterprises should be included in the planning of the soil- and crop-management program.

As soon as a definite, well-coordinated crop- and soil-management plan has been completed, it should be *put into operation.* It will pay off in continued soil productivity and good yields.

### CONVENTIONAL SYMBOLS ON SOIL MAPS

X = VERY SMALL AREAS OF OUTCROPPING SANDY LOAM TO LOAMY GRAVEL MATERIAL.  
REPRESENTS VERY SMALL SPOTS OF HENNEPIN (25) OR RODMAN (93) SOILS.

Θ = VERY SMALL, CLOSED DEPRESSIONS WHICH ARE USUALLY DARKER COLORED AND NATURALLY MORE POORLY DRAINED THAN SURROUNDING SOILS. WHERE OCCURRENCE IS VERY NUMEROUS ONLY A PORTION OF THOSE PRESENT IS INDICATED.

	MAN-MADE LAND
	DISTINCT IRON ACCUMULATIONS
— — — —	HARD SURFACE ROAD
— — — —	GRAVEL ROAD
— — — —	DIRT ROAD
— — — —	SECONDARY AND PRIVATE ROAD
— — — —	RAILROAD
— — — —	RAILROAD (ABANDONED)
■	HOUSE
■	SCHOOL
■	CHURCH
■	BUSINESS ESTABLISHMENT
	CEMETERY
	TOWN
	SWAMPY AREA

	SMALL WET SPOT
	STONY SURFACE AREA
	GRAVEL PIT
	BORROW PIT
	LIME QUARRY
	ESCARPMENT
	DAM
	SMALL POND
	LAKE
→ — — — —	CROSSABLE DRAINAGEWAY
← — — — —	NONCROSSABLE DRAINAGEWAY
— — — — →	FLOWING STREAM (SMALL)
— — — — →	FLOWING RIVER

## MEANINGS OF SOME TERMS USED

*Calcareous* - said of soils that contain enough free lime to cause them to bubble when treated with acid.

*Drainage classes* - relative groupings indicating the speed with which water is removed from the soil.

*Very poorly drained* - the water table remains at or near the surface most of the time.

*Poorly drained* - water is removed so slowly that the soil remains wet much of the time.

*Imperfectly drained* - water is removed slowly enough so that the soil is periodically wet and dry.

*Moderately well drained* - water is removed somewhat slowly so that the profile is wet a small part of the time.

*Well drained* - water is removed readily but not rapidly.

*Somewhat excessively drained* - water is removed rapidly.

*Excessively drained* - water is removed very rapidly.

*Drift* - any material transported by glacial action, either directly by ice or by water from melting ice. Drift includes till and outwash.

*Glacier* - a large mass of ice capable of moving across land.

*Horizon* - a term used for a natural structural division or layer of soil parallel to the land surface and different in appearance and characteristics from the layers above and below it.

*Leached* - dissolved and washed out of or down through the soil. This has happened with the more soluble materials, such as limestone.

*Loess* - a uniform, silty, wind-laid material which often is deposited over the top of till and outwash after the glaciers retreat.

*Moderately high level of management* - includes adequate drainage, timely use of good cultural practices, careful handling of manure, the use of limestone, phosphate, and potash as soil tests indicate, the use of a crop rotation which retards erosion and furnishes a legume or legume-grass sod frequently enough to maintain an adequate nitrogen supply and maintain good tilth. It is assumed the soil is not severely eroded.

*Outwash* - water-laid material varying in texture from clay to gravel; moving water deposited the material in layers, each layer consisting of similar-sized particles.

*Permeability* - the ease with which water and air move into or through a soil.

*Productivity* - the ability of a soil to yield crops or support other kinds of vegetation. A moderately high level of management is assumed.

*Profile* - a vertical section of soil through and including all of its horizons.

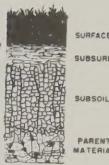
*Till* - ice-deposited material composed of various proportions of clay, silt, sand, and gravel or boulders.

*Tilth* - the physical condition of the soil that determines its suitability as an environment for plant growth.



## PART II

### BROAD SOIL ASSOCIATIONS IN McHENRY COUNTY, ILLINOIS



As shown on the front cover of this folder, the soils of McHenry county may be grouped into 16 broad associations. The main characteristics of each association are summarized in Table 1. The associations are described more fully in the following paragraphs.

Table 1 - Classification of Soil Associations According to Color of Surface Soil, Permeability of Subsoil, and Characteristics of Material Below the Subsoil

Soil association	Major soil series in each soil association	Color of surface soil	Permeability of subsoil*	Characteristics of materials below the subsoil
A	Warsaw-Lorenzo	Dark	Moderate to very rapid	Calcareous loamy gravel drift
B	Fox-Casco	Light	Moderate to very rapid	Calcareous loamy gravel drift
C	Ringwood-Griswold	Dark	Moderate to rapid	Calcareous sandy loam till
D	McHenry-Lapeer	Light	Moderate to rapid	Calcareous sandy loam till
E	Saybrook-LaRose	Dark	Moderate	Calcareous loam till
F	Miami-Strawn	Light	Moderate	Calcareous loam till
G	Dana-Sidell	Dark	Moderate	Loam till, calcareous below 3½ feet
H	Xenia-Russell	Light	Moderate	Loam till, calcareous below 3½ feet
I	Elliott-Varna	Dark	Moderately slow	Calcareous silty clay loam till
J	Blount-Morley	Light	Moderately slow	Calcareous silty clay loam till
K	Brenton-Proctor	Dark	Moderate	Medium-textured outwash
M	Starks-Camden	Light	Moderate	Medium-textured outwash
N	Lomax-Volinia	Dark	Moderately rapid to rapid	Sandy and fine gravelly outwash
O	Sumner-Selma	Dark	Moderately rapid to very rapid	Sandy and fine gravelly outwash
P	Otter-Millington	Dark	Moderate to moderately rapid	Variable water-deposited sediments
Q	Houghton-Lena	Dark	Variable	Organic and mixed mineral material

\*Permeability refers to the rate of water movement through the soil. Of the terms used, *moderate* expresses the most desirable condition.

Most differences between soils result from differences in five important soil-forming factors: parent material, native vegetation, slope or topography, climate, and age. Although all these factors are important in McHenry county, parent material, native vegetation, and slope are responsible for most of the soil variations within the county.

McHenry county soils are relatively young, having been formed since the retreat of the last glaciers or ice sheets which covered northern Illinois. Two important parent materials left by the glaciers are till and outwash, which vary widely from coarse-textured gravelly material to fine-textured silty clay material. Loess (a silty, wind-blown deposit) forms a thin cover over much of the glacial till and outwash. The loess is thickest on the upland soils of the extreme western portion of the county and on the more level areas elsewhere, although the maximum thickness seldom exceeds 3 feet. In other areas the loess is much thinner, being extremely thin or entirely absent on the steeper slopes in the eastern three-fourths of the county. Plant material in varying stages of decay provides the parent material for the muck and peat soils.

Prairie grasses and deciduous forest have been the two most important forms of vegetation affecting soil development. Under grass cover, thick dark-colored surface horizons developed. Forest cover resulted in light-colored surface horizons. Areas covered by mixed grass and trees developed a medium-colored surface and a light-colored subsurface. Some of the poorly drained areas supported wet prairie and swamp vegetation, which usually produced dark-colored surface soils. The colors on the soil association map are related to the surface colors of the soils. Green areas indicate the dark-colored soils formed under prairie grasses; red areas, the light-colored soils formed under forest vegetation. Dark-colored, poorly drained bottomland and organic soils formed under wet prairie or swamp vegetation are shown in black.

Topography affects soils in many ways. In general, the steeper the slope, the faster the drainage and the less water moving through the soil profile. Steep slopes tend to have more weakly developed horizons and thinner profiles than adjacent soils on more level land. Low-lying areas and depressions which have a high water table tend to be poorly drained and water concentrates in such areas. They may also receive local sediment from higher adjacent land.

In much of McHenry county there is a mixed pattern of different parent materials and native vegetation further complicated by irregular topography. The result is that soils will vary widely within a short distance. For this reason the soil associations are, from necessity, very general.

**Soil Association A** - Warsaw, Lorenzo, and related soils. This association is found in a scattered pattern throughout the county, the larger areas occurring in Riley (T43N-R5E) and Algonquin (T43N-R8+9E) townships. These soils are primarily dark-colored and are formed from silt loam to loam material over calcareous loamy gravel. The surface horizons are usually silt loams or loams and the subsoils are usually silty clay loams or clay loams. The depth to gravel is quite variable. Usually it ranges from  $\frac{1}{2}$  to 4 feet, although the gravel occurs at greater depths in some areas. Normally, the gravel is closest to the surface in the more strongly sloping areas. Where the gravel is shallow the soils are very drouthy. Their productivity depends largely upon the thickness of the medium-textured material over the gravel, the topography, and the amount of erosion that has occurred. The level areas are medium in productivity when properly managed.

**Soil Association B** - Fox, Casco, and related soils. These soils occur in many areas in the county, but tend to be concentrated in the eastern portion. They have the same parent material as the soils in Association A; that is medium-textured material over calcareous loamy gravel. These soils, however, are light-colored, having been formed under forest or mixed forest and grass vegetation. The topography is variable, with much of the association being steeply sloping. The depth to gravel is also variable. It will usually range from  $\frac{1}{2}$  to 4 feet, with some soils included where the gravel is not this shallow or where there may be a sandy substratum rather than gravel. Gravel may occur very near the surface on the steeper slopes. The steeply sloping areas are not suited for cultivation and are maintained as permanent pasture or timber land. The more productive areas are those on nearly level topography where the gravel occurs below 3 feet. In these areas drouthiness and erosion are not such a serious problem as on the more sloping areas.

**Soil Association C** - Ringwood, Griswold, and related soils. The soils in this association occur in scattered areas in the northern and eastern portions of the county. They are dark-colored soils formed mainly from loess over sandy loam glacial till. Loess deposits range from 0 to 3 feet, with the thickest deposits occurring in the more level areas. In the more steeply sloping areas, which make up a small part of this association,

the soils may be formed almost entirely from the glacial till. In such areas erosion and drouthiness are problems. The soils that occur on the level to gently sloping topography are high to very high in productivity.

**Soil Association D** - McHenry, Lapeer, and related soils. Light-colored soils having the same parent material as Association C occur in this association. They were formed under forest vegetation and occupy a wide range of topography, including a greater number of steeply sloping areas than Association C. In the level areas the loess may be as deep as 3 feet. On the steeper slopes, however, the loess is usually thin or absent, and the soils are formed from sandy loam till. This till contains variable amounts of gravel, frequently being a gravelly sandy loam. Many of the steeper slopes are unsuited for cultivation because erosion is a hazard and the moisture-holding capacities are low. The level to moderately sloping areas, where there is some loess cover, are medium in productivity when properly managed.

**Soil Association E** - Saybrook, LaRose, and related soils. Most of the soils of this association are found in the southern part of the county, with a typical area occurring just north and east of Huntley. These soils are dark-colored and are formed mainly from loess over calcareous loam glacial till. Loess deposits, however, may be entirely absent, or they may range up to 3 feet in thickness, with the thickest loess occurring in the extreme western part of the association. The loam till is a desirable parent material. It is usually calcareous within depths of 2 to 3½ feet. Erosion is a problem in the steeply sloping areas. Many other areas need artificial drainage; where proper outlets are available, the soils drain well. If properly managed, these soils range from medium to very high in productivity.

**Soil Association F** - Miami, Strawn, and related soils. The major portion of this association occurs on a prominent morainal ridge that runs generally north and south in the western half of the county. These soils have the same parent materials as the soils in Association E; that is, 0 to 3 feet of loess over calcareous loam glacial till. Soils of Association F are lighter-colored than those in Association E and generally occur on more sloping topography. Depths to calcareous loam till usually range from 2 to 3½ feet. Some areas are too steep for cultivation, and erosion is a serious problem throughout the association. The more gently sloping areas are medium in productivity when properly managed.

**Soil Association G** - Dana, Sidell, and related soils. In total acreage this is one of the smallest of the soil association areas. It lies in the extreme western part of the county. The soils are dark-colored and occur on level to gently sloping topography. They are formed from 1 to 3 feet of loess over loam till which is usually calcareous below 3½ feet. A few areas require artificial drainage. These soils present no particular problems and are highly to very highly productive.

**Soil Association H** - Xenia, Russell, and related soils. This association is restricted to the northwestern portion of the county. The soils are light-colored and occur primarily on gently sloping topography with some strongly sloping areas included. Loess will average from 1 to 3 feet in thickness, being thinnest in the steeper areas. Loam till, usually calcareous below 3½ feet, generally occurs beneath the loess, although sandy loam till occurs instead in small areas. The long, uniform slopes in this area are in sharp contrast to the irregular topography of the upland areas in the eastern part of the county. These soils, along with those of Association G, represent the oldest glacial till soils in the county. Erosion is a problem on the steeper slopes. Under proper management these soils are medium to highly productive.

**Soil Association I** - Elliott, Varna, and related soils. This association of dark-colored soils is minor in extent, occurring south of Woodstock and in small areas west of Algonquin. The soils are formed from thin loess over calcareous silty clay loam till. They have silty clay loam to silty clay subsoils and moderately slow permeability. Surface runoff is high and erosion is a serious problem, especially on the sloping areas. Tile will function in these soils, but water moves slowly. These soils are medium to highly productive except where erosion has removed the dark surface soil.

**Soil Association J** - Blount, Morley, and related soils. These soils are found primarily in southern Dorr township (T44N-R7E), but occur also in minor areas along the eastern edge of the county, in the vicinity of Lily Lake. These soils have characteristics similar to those in Association I. They have, however, been formed under forest vegetation and are light-colored. Thin loess over calcareous silty clay loam till is the dominant parent material, although sometimes silty clay till underlies the loess. The fine-textured subsoils and substrata are responsible for moderately slow permeability and serious erosion due to runoff. The topography is more strongly sloping than in Association I and the steeper areas are unsuited for cultivation. Productivity is low to medium, depending on the slope and amount of erosion that has occurred.

The Most Intensive Rotations Recommended for Soil Type 23 Occurring on Different Slopes and With Varying Depths  
to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-G-M <sub>X</sub>	Erosion control practices not needed			
B	1		R-R-G-M-M	R-R-G-M <sub>X</sub>	R-R-G-M-M-M	R-R-G-M <sub>X</sub>	
	2		R-R-G-M-M	R-R-G-M <sub>X</sub>	R-R-G-M-M-M	R-R-G-M <sub>X</sub>	
C	1		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>X</sub>	
	2		R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>X</sub>	
	3		R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	R-R-G-M <sub>X</sub>	
D	1		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
	2		G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
	3		G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>X</sub> = portion of hay or pasture is returned by plowing under. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected on nearly level to gently sloping topography under a moderately high level of management are 49 bushels of corn, 38 bushels of oats, 21 bushels of wheat, and 21 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Some areas of Blount may be better adapted to permanent pasture, woodland, or wildlife than to crops. The following recommendations apply to such areas and to any others you may care to use in these ways.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern brome grass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately-stocked, existing stands of desirable species such as white oak, red oak, black walnut, basswood, ash, sugar maple, and black cherry will grow up to 500 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Norway spruce and white pine may be planted for Christmas trees.
4. Protect from fire and grazing.

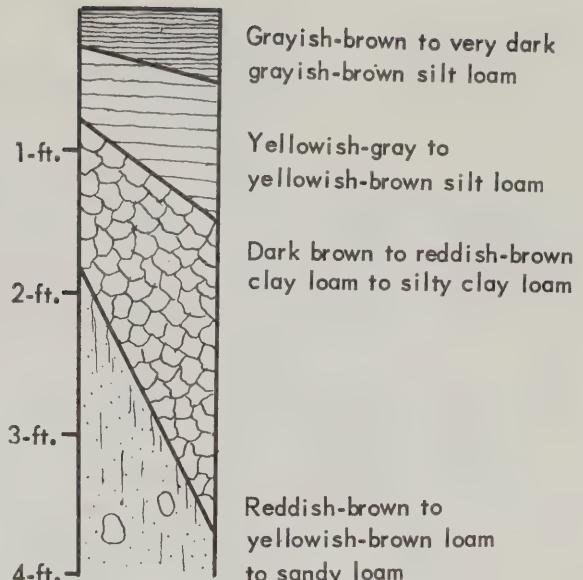
##### **Wildlife**

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 24 MIAMI SILT LOAM
- 134 CAMDEN SILT LOAM
- 224 STRAWN SILT LOAM
- 291 XENIA SILT LOAM
- 310 McHENRY SILT LOAM
- 322 RUSSELL SILT LOAM

Light-colored, moderately well-drained to well-drained soils having silt loam surfaces and clay loam to silty clay loam subsoils. Except for Strawn and some of the Russell, which occurs on moderately to steeply sloping topography, these soils occur on nearly level to moderately sloping topography. Miami, Strawn, Xenia, and Russell are formed from thin loess underlain with calcareous loam till. The loess may occasionally be as thick as 3 feet. Xenia and Russell are more deeply leached than Miami or Strawn. McHenry is formed from 1 to 3 feet of loess underlain by calcareous sandy loam till. Camden is formed from medium-textured outwash.



Grayish-brown to very dark grayish-brown silt loam

Yellowish-gray to yellowish-brown silt loam

Dark brown to reddish-brown clay loam to silty clay loam

Reddish-brown to yellowish-brown loam to sandy loam

## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Erosion control and the maintenance of fertility are major problems.*

### Drainage

Drainage is not usually needed except for occasional seepy spots where tile will function readily.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

These soils have a low organic-matter content. They respond well to regular additions of animal manure, crop residues, and commercial fertilizers.

If erosion has not been severe, these soils have favorable soil tilth, which can be maintained by using a good rotation and by adding organic matter regularly.

### Erosion Control

Erosion is a serious problem on the more sloping areas. It can be controlled by using the recommended rotations and conservation practices such as strip cropping and contouring. The loss of the surface soil will greatly reduce the productivity of these soils.

### Cropping Program and Conservation Practices

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G-M<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M-M or an R-R-M (skip-row planting) rotation is recommended. Consult the following table for recommended rotations and practices for other slopes and depths of surface.

The Most Intensive Crop Rotations Recommended for Soil Types 24, 134, 224, 291, 310, and 322 Occurring on  
Different Slopes and With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*		Crop rotations recommended for—			
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-R-G-M <sub>x</sub>	Erosion control practices not needed			
B	+, ++, 0, 1 2 3		R-R-G-M	R-R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
			R-R-G-M-M	R-R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
			R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
C	1 2 3 4		R-R-G-M-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
			R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
			R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
			Pasture or woodland	R-G-M-M-M-M	R-R-G-M-M-M	Not recommended	
D	1 2 3 4		R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
			R-G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
				R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	
				Permanent pasture or woodland			
E	1 2 3 4		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	Not recommended	
			G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M		
				Permanent pasture or woodland			
F	All						

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing under. For example, an R-G-M rotation includes 1 year of row crop, 1 year of small grain, and 1 year of hay or rotation pasture in a 3-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are 57 bushels of corn, 38 bushels of oats, 22 bushels of wheat, and 21 bushels of soybeans. Corn and soybeans are not adapted on Strawn and Russell except on the gentle slopes.

#### OTHER MANAGEMENT SUGGESTIONS

As shown by the foregoing table, certain areas are not suitable for crops. They should be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately-stocked, existing stands of desirable species such as ash, basswood, black walnut, red oak, white oak, black oak, white ash, sugar maple, and black cherry will grow up to 500 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of red pine and white pine, if properly managed, will produce fence post material in 10 to 12 years and small saw logs in about 30 years.
5. Scotch and red pine may be planted for Christmas trees.

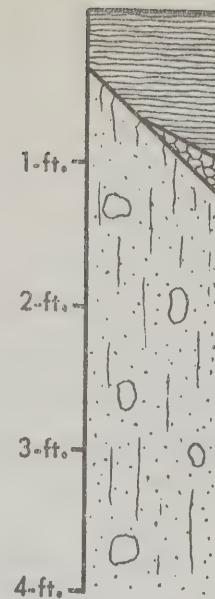
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 25 HENNEPIN LOAM

Light to moderately dark-colored, well-drained to excessively-drained soil having a loam surface underlain with calcareous loam or sandy loam till. Hennepin may occasionally have a thin clay loam subsoil. This soil usually occurs on strongly to steeply sloping topography.



Brown to yellowish-gray loam

Yellowish-gray to brownish-yellow clay loam to gravelly clay loam

Yellowish-brown to reddish-brown sandy loam to loam

### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are controlling erosion, maintaining fertility, and combating drouthiness.*

#### Drainage

Artificial drainage is not needed since this soil is well to excessively drained.

#### Fertility and Maintenance of Tilth

Under virgin conditions, Hennepin is neutral to calcareous, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

The organic-matter content is moderately low to low. Crop residues, manure, or commercial fertilizers should be used to supply nitrogen for good crop growth.

The soil will have unfavorable tilth unless a good rotation which includes grasses and legumes is adopted, and unless erosion is controlled.

#### Erosion Control

Erosion is very serious on Hennepin. Once the surface has been lost by erosion, the yields will be drastically reduced. If recommended rotations and necessary conservation practices are used, erosion can be kept at a minimum. Cover crops should be used as often as possible. All plowing should be done in the spring.

#### Cropping Program and Conservation Practices

Because of erosion and drouthiness, this soil is not well adapted to grain crops. Forage crops, however, will produce good yields if properly managed. Many slopes are too steep for cultivation.

The Most Intensive Crop Rotations Recommended for Soil Type 25 Occurring on Different Slopes and With Varying  
 Depths to Subsoil  
 (See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
C	1		R-G-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>X</sub>
	2		R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>X</sub>
	3		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-G <sub>X</sub>
	4				Permanent pasture or woodland	
D	1		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M
	2		G-M-M-M-M	R-G-M-M	R-G-M-M	R-R-G-M
	3		G-M-M-M-M	R-G-M-M-M	R-G-M-M	R-R-G-M-M
	4				Permanent pasture or woodland	
E	1			G-M-M-M-M	R-G-M-M-M-M	Not recommended
	2				Permanent pasture or woodland	
	3				Permanent pasture or woodland	
	4				Permanent pasture or woodland	
F	1,2					
	3,4					

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

#### OTHER MANAGEMENT SUGGESTIONS

Hennepin will usually be used for permanent pasture, woodland, or wildlife. The following recommendations are for such purposes.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Adequately-stocked, existing stands of desirable species, such as white oak, red oak, black oak, bur oak, ash, and black walnut will grow up to 200 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of Austrian pine, if properly managed, will produce fence post material in 15 to 20 years and small saw logs in about 40 years.
5. Scotch, white, and red pine may be planted for Christmas trees.

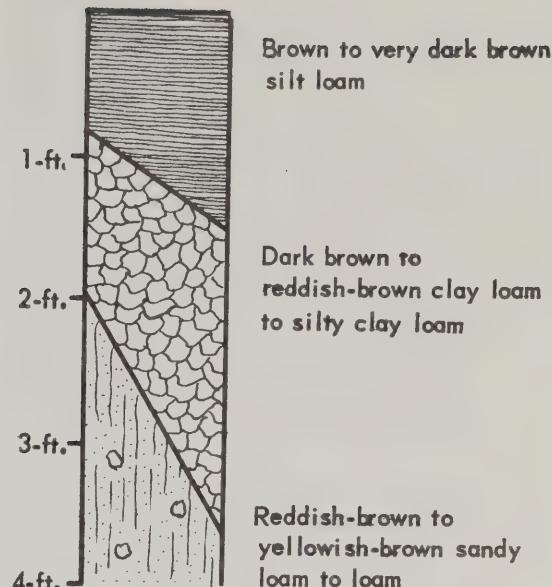
##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 55 SIDELL SILT LOAM
- 56 DANA SILT LOAM
- 60 LaROSE SILT LOAM
- 145 SAYBROOK SILT LOAM
- 148 PROCTOR SILT LOAM
- 297 RINGWOOD SILT LOAM

Dark-colored, moderately well-drained to well-drained soils having silt loam surfaces and clay loam to silty clay loam subsoils. Except for LaRose and some of the Sidell, which occur on moderately to steeply sloping topography, these soils occur on nearly level to moderately sloping topography. Sidell, Dana, Saybrook, and LaRose are formed from thin loess underlain with calcareous loam till. The loess may occasionally be as thick as 3 feet. Sidell and Dana are more deeply leached than Saybrook or LaRose. Ringwood is formed from 1 to 3 feet of loess underlain with calcareous sandy loam till. Proctor is formed from neutral, medium-textured outwash.



Brown to very dark brown silt loam

Dark brown to reddish-brown clay loam to silty clay loam

Reddish-brown to yellowish-brown sandy loam to loam

## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Erosion control and maintenance of fertility are the major problems on these soils.*

### Drainage

Drainage is not usually needed except for occasional seepy spots where tile will function readily.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

These soils are very responsive to good management. Organic matter and nitrogen should be added regularly for maximum crop yields even though these soils are naturally high in organic matter.

A rotation which includes deep-rooting legumes and fibrous-rooted grasses not only provides nitrogen and organic matter, but also helps to reduce erosion, maintain desirable tilth, and maintain favorable air and water movement.

### Erosion Control

Erosion is a serious problem on the more sloping areas. It must be controlled through the use of recommended rotations and conservation practices. The loss of the surface will greatly reduce the productivity of these soils.

### Cropping Program and Conservation Practices

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

The Most Intensive Crop Rotations Recommended for Soil Types 55, 56, 60, 145, 148, and 297 Occurring on Different  
Slopes and With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land cap-ability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-R-G <sub>x</sub>	Erosion control practices not needed			
B	0,1		R-R-R-R-G-M	R-R-R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>x</sub>	
	2		R-R-R-G-M	R-R-R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>x</sub>	
	3		R-R-G-M-M	R-R-R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>x</sub>	
C	0,1		R-R-G-M-M	R-R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>x</sub>	
	2		R-R-G-M-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>x</sub>	
	3		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-R-G-M	
D	0,1		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
	2		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
	3		G-M-M-M-M	G-M-M-M	R-G-M-M	R-G-M-M	
E	0,1			G-M-M-M-M	R-G-M-M	Not recommended	
	2			G-M-M-M-M	R-G-M-M		
	3						
F	1,2			Permanent pasture or woodland			
	3,4						

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are 64 bushels of corn, 49 bushels of oats, 24 bushels of wheat, and 25 bushels of soybeans. Corn and soybeans are not adapted on LaRose except on the gentle slopes.

#### OTHER MANAGEMENT SUGGESTIONS

Most areas will be used for cropland, but a few areas should be used for permanent pasture, woodland, or wildlife. For such areas, the following recommendations apply.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 10 to 12 years and small saw logs in about 30 years.
2. Scotch and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

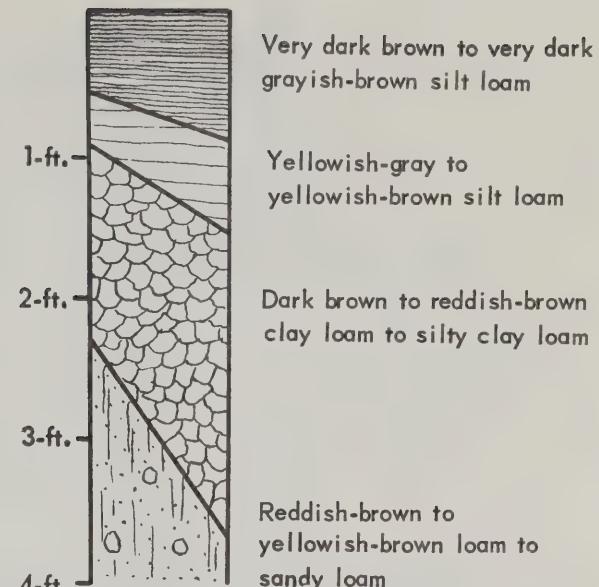
##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the border of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 57 MONTMORENCI SILT LOAM
- 299 NIPPERSINK SILT LOAM
- 344 HARVARD SILT LOAM
- 348 WINGATE SILT LOAM

Moderately light-colored, moderately well-drained to well-drained soils having silt loam surfaces and clay loam to silty clay loam subsoils and occurring on nearly level to moderately sloping topography. Montmorenci and Wingate are formed from thin loess underlain with calcareous loam till. The loess may occasionally be as thick as 3 feet. Wingate is more deeply leached than Montmorenci. Nippersink is formed from 1 to 3 feet of loess underlain by calcareous sandy loam till. Harvard is formed from neutral, medium-textured outwash.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problem on these soils are controlling erosion and maintaining fertility.*

### Drainage

Drainage is not usually needed except for occasional seepy spots where tile will function readily.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

The organic-matter content is moderately low. For good crop growth and desirable tilth, organic matter should be supplied regularly in the form of manures or crop residues. Nitrogen may also be added in a commercial fertilizer.

These soils respond very well to good management.

### Erosion Control

Erosion is a serious problem on sloping areas. It can be controlled by including legumes and grasses in the rotation and by using such conservation practices as contouring and strip cropping.

### Cropping Program and Conservation Practices

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are 60 bushels of corn, 44 bushels of oats, 23 bushels of wheat and 23 bushels of soybeans.

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

The Most Intensive Rotation Recommended for Soil Types 57, 299, 344, and 348 Occurring on Different Slopes and With  
 Varying Depths to Subsoil  
 (See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-G <sub>x</sub>	Erosion control practices not needed			
B	1 2 3		R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
			R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
			R-R-G-M-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
C	1 2 3		R-G-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>	
			R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>	
			R-G-M-M-M	R-R-G <sub>x</sub> -M-M	R-R-G-M-M-M	R-G	
D	1 2 3		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
			G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
			G-M-M-M-M	R-G-M-M-M	R-G-M-M	R-R-G-M-M	
E	1 2 3		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	Practice not recommended	
			G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M		
			Permanent pasture or woodland				

\* For an explanation of Soil Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-G-M-M rotation includes 1 year of row crop, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

#### OTHER MANAGEMENT SUGGESTIONS

Most areas of these soils can be used for cropland but certain areas should be used for permanent pasture, woodland, or wildlife. The following recommendations apply both to these areas and to any others you may want to use for the above-mentioned purposes.

##### Permanent Pasture

1. Test soil and correct any deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing. Leave topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 10 to 12 years and small saw logs in about 30 years. Scotch and red pine may be planted for Christmas trees.
2. Protect from fire and grazing.

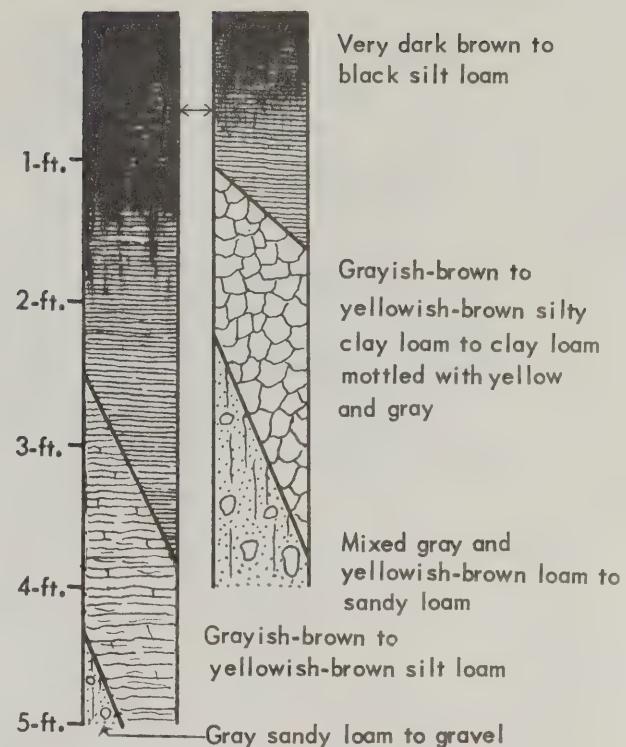
##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 59 LISBON SILT LOAM
- 149 BRENTON SILT LOAM
- 197 TROXEL SILT LOAM
- 198 ELBURN SILT LOAM

Dark-colored, imperfectly drained soils having silt loam surfaces and clay loam to silty clay loam subsoils. Lisbon, Brenton, and Elburn (right diagram) occur on level to gently rolling topography. Troxel (left diagram) occurs on level to depressional topography. Lisbon and Elburn are formed from approximately 20 to 40 inches of silty material underlain with calcareous loam (Lisbon) and sandy loam till (Elburn). Brenton is formed from neutral, medium-textured outwash. Troxel is formed from silt loam to loam local wash underlain with coarse-textured outwash or till. Troxel has very little clay accumulation throughout the soil profile.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major agricultural problem on these soils is providing adequate drainage. Although these are good soils, maintaining fertility should receive consideration.*

#### Drainage

These soils have moderate permeability and tile will function readily. For adequate drainage, tile lines should be spaced 80 to 100 feet apart at a depth of 3 feet. In Troxel, surface inlets to the tile and grass waterways will help to dispose of excess water quickly.

#### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are slightly acid, medium to low in available phosphorus, and high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

The organic-matter content of these soils is high. However, for sustained production, some form of nitrogen should be added regularly. Commercial nitrogen should be supplied when a catch crop is used.

Regular additions of organic matter will not only supply nitrogen but will also maintain favorable tilth, help tile to function properly, and maintain good air and moisture relationships.

#### Erosion Control

Erosion is usually not a problem on these soils.

#### Cropping Program and Conservation Practices

The average crop yields per acre to be expected on nearly level areas under a moderately high level of management are 70 bushels of corn, 52 bushels of oats, 25 bushels of wheat, and 27 bushels of soybeans.

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-M (skip-row planting) or R-R-G-M rotation is recommended. The following table gives rotations recommended for other slopes and depths of topsoil.

The Most Intensive Rotations Recommended for Soil Types 59, 149, 197, and 198, Occurring on Different Slopes and  
With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-R-G <sub>X</sub>	Erosion control practices not needed			
B	+, ++, 0, 1 2		R-R-R-R-G-M	R-R-R-G <sub>X</sub>	R-R-G-M-M-M	R-R-R-G <sub>X</sub>	
			R-R-R-G-M	R-R-R-G <sub>X</sub>	R-R-G-M-M-M	R-R-R-G <sub>X</sub>	
C	+, ++, 0, 1 2		R-R-G-M-M	R-R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>X</sub>	
			R-R-G-M-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G <sub>X</sub>	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

#### OTHER MANAGEMENT SUGGESTIONS

Although these soils are very productive if adequately drained, limited areas may be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

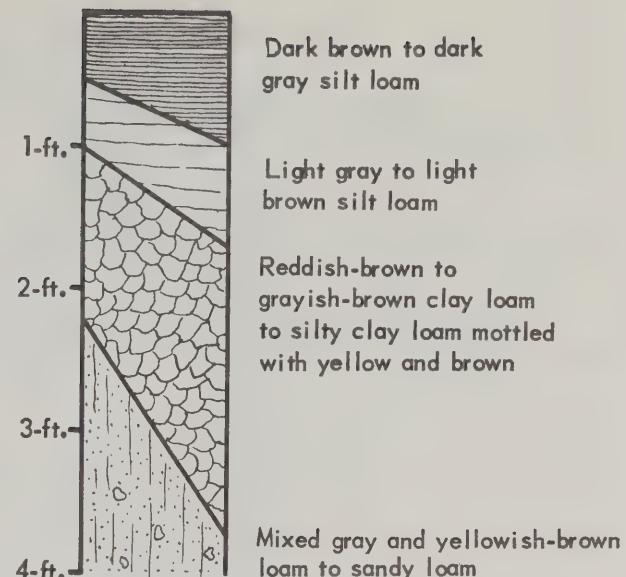
### 62 HERBERT SILT LOAM

### 104 VIRGIL SILT LOAM

### 219 MILLBROOK SILT LOAM

### 353 TORONTO SILT LOAM

Moderately dark-colored, imperfectly drained soils having silt loam surfaces with clay loam to silty clay loam subsoils and occurring on level to gently rolling topography. Herbert and Toronto are formed from 20 to 40 inches of silty material underlain with calcareous loam till. Toronto is more deeply leached than Herbert. Virgil is formed from 30 to 40 inches of silty material underlain with calcareous sandy loam till. Millbrook is formed from neutral, medium-textured outwash.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major agricultural problems on these soils are obtaining proper drainage and maintaining fertility.*

### Drainage

These soils have moderate permeability and tile will function readily. If placed at a depth of 3 feet, tile lines should be spaced 80 to 100 feet apart for adequate drainage.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, medium to low in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

The organic-matter content of these soils is normally moderately high, but for good crop growth, organic matter should be added at regular intervals. When a catch crop is used, commercial nitrogen should be applied.

Adding organic matter regularly, either by spreading manure or by plowing under legume-grass sod crops, will help tile to function properly, maintain favorable tilth, and provide good moisture and air relationships.

### Erosion Control

Erosion is very seldom a problem on these soils.

### Cropping Program and Conservation Practices

A crop rotation should be used that will provide adequate organic matter, control erosion, and maintain favorable soil tilth. On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

The Most Intensive Rotation Recommended for Soil Types 62, 104, 219, and 353 Occurring on Different Slopes  
and With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+, ++, 0, 1		R-R-R-G <sub>X</sub>	Erosion control practices not needed		
B	+, ++, 0, 1		R-R-G-M-M	R-R-G-M <sub>X</sub>	R-R-G-M-M-M	R-R-G-M <sub>X</sub>
C	+, ++, 0, 1 2		R-G-M-M	R-R-G-M-M-M	R-R-G-M-M-M-M	R-R-G-M <sub>X</sub>
			R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M-M	R-R-G-M <sub>X</sub>
D	0, 1 2		R-G-M-M-M-M-M	R-G-M-M	R-R-G-M-M-M-M	R-R-G-M <sub>X</sub>
			G-M-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M-M	R-R-G-M-M-M

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture; M<sub>X</sub> = portion of meadow is returned by plowing down. For example, an R-G-M rotation includes 1 year of row crop, 1 year of small grain, and 1 year of rotation pasture or hay in a 3-year period.

The average crop yields per acre to be expected on nearly level areas under a moderately high level of management are 63 bushels of corn, 46 bushels of oats, 24 bushels of wheat, and 24 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although these soils are very productive if adequately drained, limited areas may be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

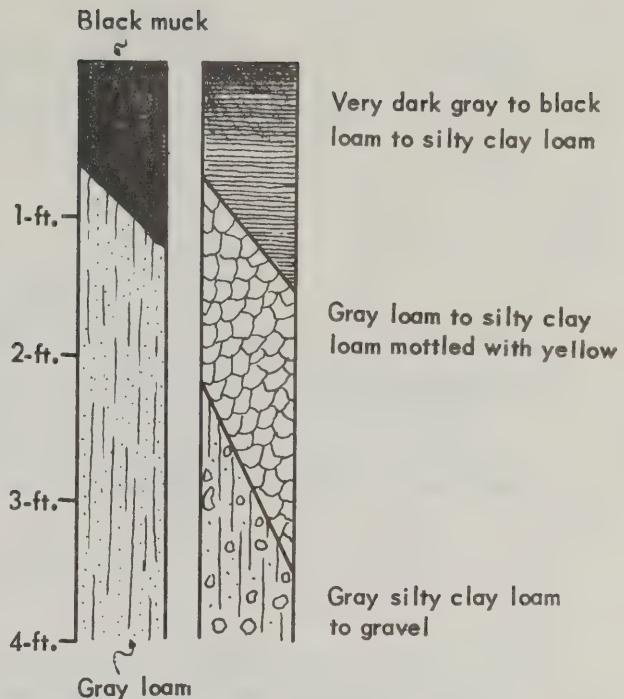
## USE AND MANAGEMENT OF SOIL TYPES:

### 67 HARPSTER SILTY CLAY LOAM

### 210LA1 LENA MUCK

### 347 HARPSTER SILT LOAM TO LOAM

Very dark-colored, very poorly to poorly drained soils occurring on slightly depressional to steeply sloping topography. The Harpster soils (right diagram) have loam to silty clay loam surfaces and loam to silty clay loam subsoils. They are formed from variably textured outwash or till. Lena muck (left diagram) has 7 to 14 inches of black muck underlain with loamy mineral sediments. These soils often contain small snail fragments on the surface and throughout the profile.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining fertility are major problems on these soils. In some cases maintaining good tilth should receive attention.*

### Drainage

Providing adequate drainage is a first requirement on these soils. Since they have moderate permeability, tile will function well if adequate outlets are available. For adequate drainage, place the tile 4 feet deep and space the tile lines 100 to 120 feet apart. Many areas may require drainage ditches to obtain suitable tile outlets and to lower the water table for good crop growth. When sloping areas are wet because of springs, it is advisable to use tile to intercept the water between its source and the point where it emerges on the surface.

Before draining, the entire area should be checked for springs, sand and gravel layers or pockets, impermeable layers of silt or clay, and mucky spots which may cause problems in the installation and functioning of tile lines.

### Fertility and Maintenance of Tilth

These soils are calcareous with occasional neutral spots and are frequently low in available potassium. Superphosphate should be used rather than rock phosphate to correct any phosphorus deficiency.

These soils are naturally high in organic matter. Even so, it is desirable to plow under leguminous sod crops at regular intervals to maintain organic matter and provide nitrogen. Growing and plowing under legume sods will also help to maintain favorable tilth, to improve the functioning of tile, and to keep the subsoil favorable for good air, water, and root movement.

If tilled when wet, Harpster (67) tends to become cloddy on the surface and compacted below the plow layer.

### Erosion Control

Erosion is not a problem on level areas, but it may be serious on sloping areas. If a sloping area is undrained, permanent vegetation should be maintained. On sloping areas that are drained, a rotation should be used that will prevent excessive soil losses.

### Cropping Program and Conservation Practices

On level land which has favorable soil tilth, the most intensive rotation recommended is an R-R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. Where these soils occur on slopes or have been subjected to erosion, consult the following table.

The Most Intensive Rotations Recommended for Soil Types 67, 210LA1 and 347 Occurring on Different Slopes and  
With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+, ++, 0, 1		R-R-R-G <sub>x</sub>	Erosion control practices not needed		
B	+, ++, 0, 1 2		R-R-R-R-G-M R-R-R-G-M	Practices not recommended		
C	0, 1		R-R-G-M-M			
D	0, 1		R-G-M-M-M-M			

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture; for example, an R-G-M rotation includes 1 year of row crop, 1 year of small grain, and 1 year of hay or rotation pasture in a 3-year period.

The average crop yields per acre to be expected on level areas of Harpster under a moderately high level of management are 64 bushels of corn, 43 bushels of oats, 21 bushels of wheat, and 25 bushels of soybeans. The yields on Lena are variable and will probably tend to be lower.

#### OTHER MANAGEMENT SUGGESTIONS

Although the drained, level areas are generally used for cropland, you may prefer to use limited areas for permanent pasture or wildlife. The following recommendations apply to such areas.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Wildlife**

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

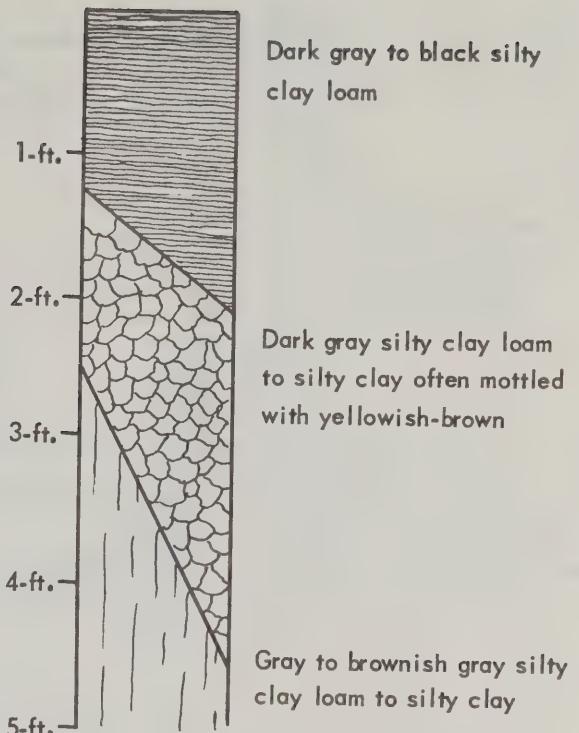
## USE AND MANAGEMENT OF SOIL TYPES:

### 69 MILFORD SILTY CLAY LOAM

### 232 ASHKUM SILTY CLAY LOAM

### 330 PEOTONE SILTY CLAY LOAM

Very dark-colored, poorly drained soils having silty clay loam surfaces and silty clay loam to silty clay subsoils. Milford is formed from silty clay loam outwash and occurs on level to nearly level topography. Ashkum is formed from silty clay loam till and occurs on level to slightly sloping topography. Peotone is formed from silty clay loam to silty clay outwash or till and occurs in depressions.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on these soils are providing adequate drainage and maintaining favorable tilth.*

### Drainage

Adequate drainage is one of the first requirements on these soils. They have moderately slow permeability, but tile will function satisfactorily under good management if outlets are available. Surface waterways or surface inlets may be desirable to remove concentrated surface water. Tile lines should be spaced 50 to 75 feet apart if placed at a depth of 3 to 3½ feet.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are neutral to slightly acid with occasional calcareous spots. They are variable in available phosphorus and usually high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Sod crops should be plowed under at regular intervals to supply fresh organic matter and nitrogen although the natural organic-matter content is very high.

Since these soils are moderately fine-textured, they should not be plowed when wet. If they are worked when wet, clods will form and tilth will become unfavorable. Fall plowing is usually desirable.

### Erosion Control

Erosion is normally not a problem on these soils.

### Cropping Program and Conservation Practices

A good crop rotation which includes deep-rooting legumes and fibrous-rooted grasses will provide fresh organic matter and nitrogen, improve function of tile, aid air and water movement, encourage root penetration, and improve soil tilth and structure.

On level land which has favorable tilth, the most intensive crop rotation recommended is an R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. For other recommendations see the following table.

Most Intensive Crop Rotations Recommended for Soil Types 69, 232, and 330 Occurring on Different Slopes and With  
Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+, ++, 0, 1		R-R-G <sub>X</sub>	Erosion control practices not needed		
B	+, ++, 0, 1		R-R-G-M	Practices not recommended		
C	+, ++, 0, 1		R-G-M			

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

The average crop yields per acre to be expected under a moderately high level of management are 65 bushels of corn, 46 bushels of oats, 23 bushels of wheat, and 27 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although nearly level, productive soils such as these are generally used for cropland if drained, you may prefer to use limited areas for other purposes. The following recommendations are made for permanent pasture and wildlife.

#### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

#### Wildlife

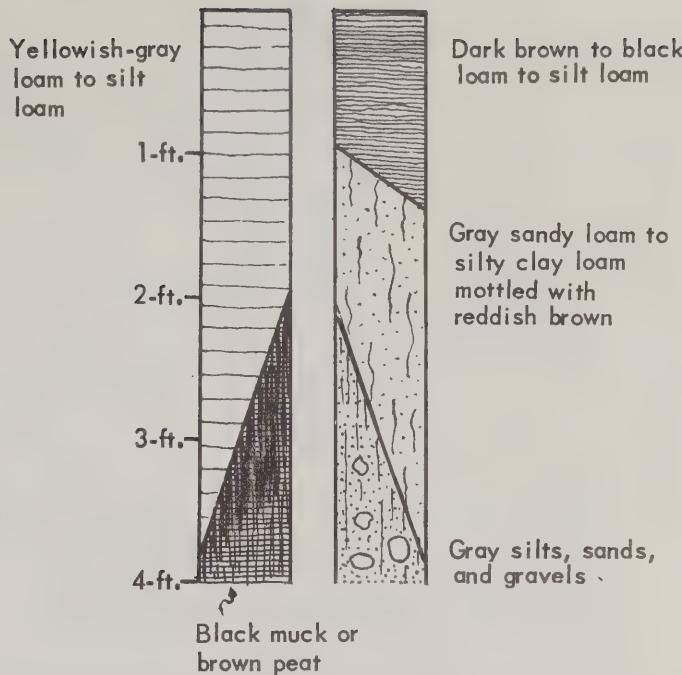
1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:\*

### 76 OTTER LOAM

### 292 WALLKILL SILT LOAM

Otter (right diagram) is a dark to very dark-colored, poorly drained, bottom-land soil having a loam to silt loam surface and formed from variably textured overflow sediments. Wallkill (left diagram) is a poorly drained soil formed from 24 inches or more of light to moderately dark-colored silt loam to loam material that has been washed in from surrounding slopes and overlies muck or peat.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major agricultural problems on these soils are providing adequate drainage and maintaining fertility.*

### Drainage

Artificial drainage is usually needed. There may, however, be some problems in installing tile. In Wallkill, the underlying organic material may cause difficulty. In Otter, the entire area should be checked for springs, sand and gravel layers or pockets, impermeable layers of silt or clay, and mucky areas. Where drainage is not practical, the land is best suited for permanent pasture.

In areas where outlets are available, tile will usually function adequately. These soils have moderate permeability.

### Fertility and Maintenance of Tilth

Otter is neutral with occasional calcareous spots. Both Otter and Wallkill are quite variable in available phosphorus and potassium. Soil tests should be made and fertilizers applied according to the tests.

Otter is naturally high in organic matter, but sod crops should occasionally be plowed under and manure added to maintain favorable tilth and supply nitrogen for crop growth. Wallkill is low to moderately low in organic matter and responds well to frequent additions of organic matter and nitrogen.

### Erosion Control

Erosion is not ordinarily a problem on these soils, but occasionally fast-flowing water or stream-bank cutting may cause erosion on Otter. Otter receives deposits of other materials from overflow, which may be beneficial or harmful depending on the kind of material deposited.

\* These soil types are included in Land Capability Class



For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## Cropping Program and Conservation Practices

On level land with adequate drainage and favorable tilth, the most intensive rotation recommended is an R-R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. When these soils occur on a "B" slope, an R-R-R-G-M rotation is recommended.

The letters have the following meanings: R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-R-G-M rotation includes 3 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 5-year period.

Crop yields vary, depending upon the fertility of the material deposited on Wallkill; and on the frequency of overflow and effectiveness of artificial drainage on Otter.

## OTHER MANAGEMENT SUGGESTIONS

Most areas, if drained, will be used for cropland. The following recommendations for permanent pasture and wildlife apply to undrained areas and to drained areas that you may wish to use for such purposes.

### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

### Wildlife

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

79 VOLINIA LOAM TO SILT LOAM

265 LOMAX LOAM

290 WARSAW SILT LOAM TO LOAM

290-318 WARSAW-LORENZO COMPLEX

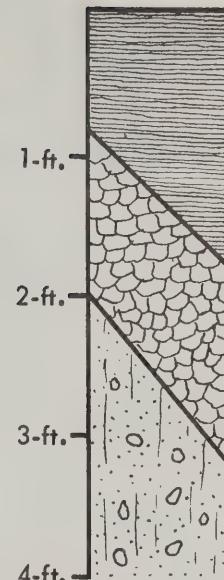
363 GRISWOLD LOAM

Dark-colored, well-drained soils having loam to silt loam surfaces.

Except Lomax, which has a loam subsoil, these soils have clay loam to silty clay loam subsoils. Lomax and Volinia occur on level to moderately sloping topography, while Griswold, Warsaw, and Warsaw-Lorenzo complex occur on level to steeply sloping topography. Griswold is generally formed from 6 to 12 inches of silty material overlying sandy loam till which is calcareous in the lower part. In some areas the silty material is less than 6 inches or entirely lacking.

Lomax is formed from loam to sandy loam outwash. Volinia is formed from thin silt loam to loam material over coarse, loose outwash sands.

Warsaw is formed from 24 to 40 inches and Lorenzo from less than 24 inches of silt loam or loam material over coarse, calcareous, gravelly drift. Because depth to gravel is variable in areas of Warsaw and Lorenzo, these soils are often indicated as complexes. Occasionally, the soil numbers 290 and 290-318 are followed with the letter (S), which indicates the substrata contain more sand and less gravel than is normal.



Brown to very dark brown loam to silt loam

Yellowish-brown to dark brown loam, clay loam, or silty clay loam

Brown to yellowish-brown sandy loam to gravel

## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Conserving moisture, controlling erosion, and maintaining fertility are the major problems on these soils.*

### Drainage

These soils have adequate drainage; in fact, excessive drainage is a problem.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

These soils have a moderately high organic-matter content. However, for sustained production, organic matter should be added regularly in the form of crop residues or manure. Commercial nitrogen may also be used, especially when a catch crop is grown.

If erosion has not been severe, these soils usually have favorable tilth which can be maintained by following the recommended rotations.

### Erosion Control

Even though these soils are porous and will absorb a large amount of water, conservation practices and a good rotation must be used to control erosion and runoff on the sloping areas. If these soils are seriously eroded, the crop yields will be greatly reduced.

### Cropping Program and Conservation Practices

On level land which has no erosion problem and which also has favorable tilth, the most intensive rotation recommended is an R-R-R-G-M<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

The Most Intensive Rotations Recommended for Soil Types 79, 265, 290, 290-318, and 363 Occurring on  
Different Slopes and With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+,-,0,1		R-R-R-G-M <sub>x</sub>	Erosion control practices not needed			
B	0,1		R-R-G-M	R-R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
	2		R-R-G-M	R-R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
	3		R-R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
C	0,1		R-R-G-M-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
	2		R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>	
	3		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M	
D	0,1		R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
	2		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
	3		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
E	1		G-M-M-M-M	G-M-M-M-M	R-R-G-M-M-M	Not recommended	
	2		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M		
	3						
	4						
F	All		Permanent pasture or woodland				

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

In dry years, drouth is a problem and will reduce the yields considerably. The average crop yields per acre to be expected under a moderately high level of management on gently to moderately sloping topography are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Warsaw-Lorenzo complex, Lomax, Volinia, and Griswold	56	42	23	22
Warsaw	63	48	24	25

#### OTHER MANAGEMENT SUGGESTIONS

Most areas of these soils are used for cropland. Some areas, however, are better suited to permanent pasture, woodland, or wildlife. For these areas and other areas you may wish to use for such purposes, the following recommendations apply.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Plantations of Austrian, red, and white pine, if properly managed, will produce fence post material in 15 to 20 years and small saw logs in about 40 years.
2. Scotch and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

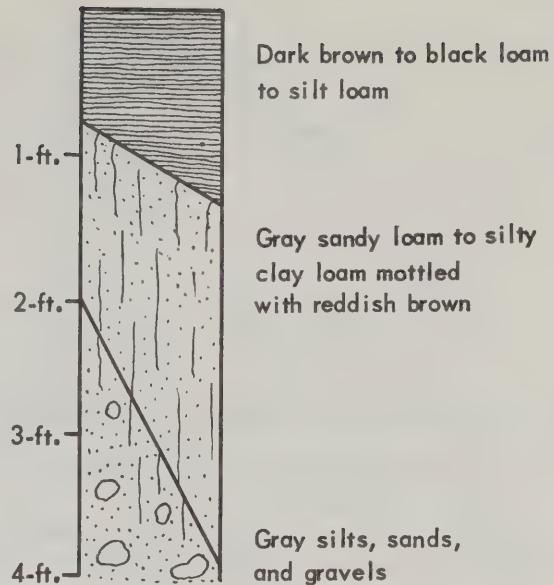
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPE:

### 82 MILLINGTON LOAM

Dark to very dark-colored, poorly drained soil having a loam to silt loam surface. Millington is a bottomland soil formed from variable-textured overflow sediments and may include small areas of sand, gravel, and muck. Snail shell fragments usually occur on the surface and throughout the profile.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining fertility are the major agricultural problems on this soil.*

#### **Drainage**

Millington is too wet for cultivated crops unless drainage is provided. Tile will usually function adequately if outlets are available. Before draining, however, the entire area should be checked for springs, sand and gravel layers or pockets, impermeable layers of silt and clay, and mucky spots, any one of which may cause problems in the installation and functioning of tile. Where drainage is not practical, the land should be used for permanent pasture.

#### **Fertility and Maintenance of Tilth**

Under natural conditions, Millington is calcareous with occasional neutral spots and is quite variable in available phosphorus and potassium. Superphosphate rather than rock phosphate should be used to correct phosphate deficiencies.

The organic-matter content is naturally high, but sod crops should be plowed under and manure added to maintain favorable tilth and a supply of nitrogen for good crop growth.

#### **Erosion Control**

Erosion is not ordinarily a problem, although occasionally some may be caused by rapidly flowing water or by stream-bank cutting. Millington receives deposits of other materials from overflow. This may be beneficial or harmful depending on the kind of material deposited.

#### **Cropping Program and Conservation Practices**

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-M (skip-row planting) or an R-R-G-M rotation is recommended. Rotations recommended for other slopes and depths to subsoil are given in the following table.

The Most Intensive Rotation Recommended on Soil Type 82 Occurring on Different Slopes and With Varying Depths  
to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+, +, 0, 1		R-R-R-G <sub>X</sub>	Erosion control practices not needed		
B	0, 1,		R-R-R-G-M	Practices not recommended		
C	0, 1		R-R-G-M			

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

Crop yields are highly variable depending on frequency of overflow, effectiveness of artificial drainage, and amount of excess lime present.

#### OTHER MANAGEMENT SUGGESTIONS

Many areas of this soil are used for permanent pasture and wildlife. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip pasture to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

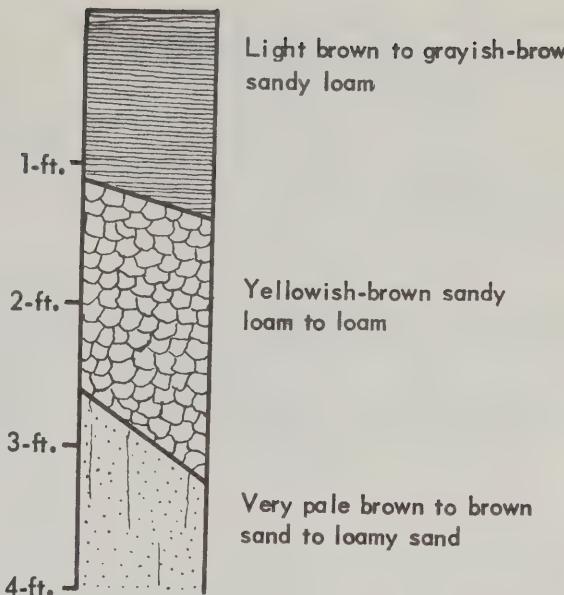
##### Wildlife

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 87 SUMNER SANDY LOAM

Moderately dark-colored, well to somewhat excessively-drained soil having a sandy loam surface and a sandy loam to loam subsoil. Sumner is formed from outwash sands and occurs on gently to moderately sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Building up soil fertility, controlling wind erosion, and conserving soil moisture are major problems on this soil.*

### Drainage

Drainage is not a problem on this soil since it is naturally well drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, Sumner is medium acid and low to medium in available phosphorus and potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing. Because sandy soils have a low nutrient-holding capacity, fertilizers should be added frequently and in moderate amounts.

For good crop growth, organic matter and nitrogen should be added frequently, because decomposition is rapid and it is impossible to build up a large reserve supply. Addition of organic matter will also increase the water- and nutrient-holding capacity and maintain good tilth. Sumner is easy to cultivate; however, the surface soil is more loose and sandy than is desirable.

### Erosion Control

The more sloping areas may be eroded by water unless protected with vegetative cover. In general, however, water erosion is minor since water moves into and through Sumner very readily. Wind erosion is a greater problem on this sandy soil. The best way to control wind erosion is to keep the ground under vegetative cover as much as possible and to strip crop at right angles to the direction of the prevailing winds.

### Cropping Program and Conservation Practices

Sumner produces fair yields in seasons of plentiful and well-distributed rainfall, if it is properly treated and if a good rotation is used. During dry years, corn and soybeans are apt to suffer from lack of moisture. Winter cover crops should be grown on sandy soils to add organic matter, decrease losses from leaching, and reduce wind erosion. On level land which has favorable soil tilth and no water-erosion problem, the most intensive rotation recommended is an R-G-M or an R<sub>x</sub>-G-M. When the tilth is considered relatively unfavorable, an R-G-M-M rotation or permanent rye or vetch is recommended. The following table gives recommended rotations for other slopes and depths to subsoil.

Most Intensive Rotations Recommended for Soil Type 87 Occurring on Different Slopes and With Varying Depths to  
Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Wind erosion control
A	+, ++, 0, 1		R <sub>x</sub> -G-M or R-G-M	Practices not needed		R <sub>x</sub> -R <sub>x</sub> -G-M
B	0, 1 2		R <sub>x</sub> -G-M R <sub>x</sub> -G-M	R-G-M R-G-M	R-G-M-M-M R-G-M-M-M	R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M
			R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M-M-M G-M-M-M-M	R-G-M R-G-M G-M-M-M-M	R-G-M-M-M R-G-M-M-M	R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -G-M
C	0, 1 2 3		R-G-M-M-M R-G-M-M-M-M	R-G-M-M R-G-M-M	R-G-M-M R-G-M-M	R-G-M-M R-G-M-M
				Permanent pasture or woodland		
			G-M-M-M-M G-M-M-M-M	G-M-M-M-M G-M-M-M-M	R-G-M-M-M-M R-G-M-M-M-M	R-G-M-M-M R-G-M-M-M
D	0, 1 2 3			Permanent pasture or woodland		
E	0, 1 2 3					
F	All					

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service Personnel.

R = row crop; R<sub>x</sub> = winter cover crop sown in or after the row crop; G = small grain; M = hay or rotation pasture. For example, an R-G-M-M rotation includes 1 year of corn, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are 46 bushels of corn, 36 bushels of oats, 19 bushels of wheat, and 17 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

As shown by the above table, some areas of Sumner are better adapted to permanent pasture or woodland than to crops; they may also be used for wildlife. The following recommendations are made for areas to be used in these ways.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa and 4 to 6 pounds of northern bromegrass per acre. Another is 6 pounds of broadleaf birdfoot trefoil and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 15 to 20 years and small logs in about 40 years.
2. Scotch pine and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Establish a three-row pine shelterbelt or multiflora rose fence where it is needed to control wind erosion and provide wildlife travel lanes.

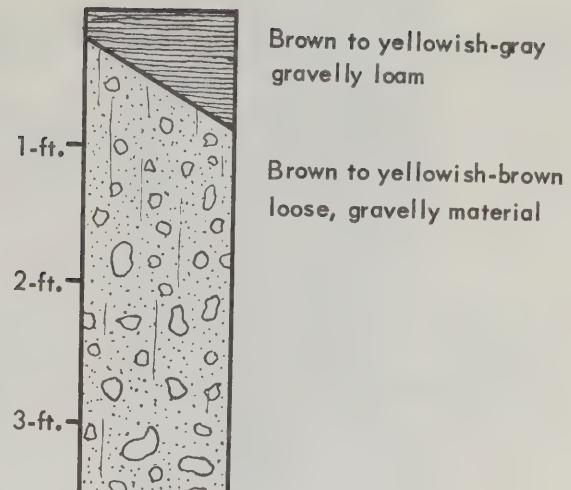
## USE AND MANAGEMENT OF SOIL TYPES:

### 93 RODMAN GRAVELLY LOAM

### 93-318 RODMAN - LORENZO COMPLEX

### 93-323 RODMAN - CASCO COMPLEX

Rodman (see diagram) is a moderately dark-colored, excessively drained soil having a gravelly loam surface directly underlain with calcareous, loose, gravelly drift. Rodman is mapped as a complex with Lorenzo and Casco where they could not be separated. In these complexes Rodman is the dominant soil. Lorenzo has a dark-colored surface and Casco has a light-colored surface. They have silt loam to loam surfaces and clay loam to silty clay loam subsoils underlain with calcareous, loose gravel at less than 24 inches. Occasionally these soil numbers are followed with the letter (S) which indicates the substrata contains more sand and less gravel than is normal. These soils occur on moderately to steeply sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Overcoming drouthiness, maintaining soil fertility, and controlling erosion are the major agricultural problems on these soils.*

### Drainage

These soils have adequate drainage; in fact, excessive drainage is a problem. Drouthiness, due to the gravelly substrata and the absence of a subsoil, strongly limits the management of Rodman.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are neutral to calcareous and low in available phosphorus and potassium. Soil tests should be made before fertilizers are applied. Fertilizers should be applied in moderate amounts frequently. Superphosphate should be used rather than rock phosphate, since rock phosphate is not effective on calcareous soils.

If uneroded, Rodman has fairly favorable tilth, but if erosion has removed the surface and exposed the gravelly substrata, tillage operations will be very difficult.

### Erosion Control

If a good vegetative cover is maintained, erosion is not a serious problem even on the strongly sloping areas. Water moves very quickly through the thin surface soil and into the loose gravelly substrata rather than flowing over the soil surface and causing erosion.

### Cropping Program and Conservation Practices

Because these soils are drouthy and also because they will erode if unprotected, they are not usually adapted to row crops. They are better suited to deep-rooting legumes and early-maturing small grains. These crops add organic matter and nitrogen, maintain favorable tilth, conserve moisture, and increase nutrient holding capacity.

On level land which has no erosion problem, the most intensive rotation recommended is an R-G-M if the tilth is favorable. When the tilth is considered relatively unfavorable, an R-G-M-M rotation is recommended. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

**The Most Intensive Crop Rotations Recommended for Soil Types 93, 93-318 and 93-323 Occurring on Different Slopes and With Varying Depths to Subsoil**  
 (See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	1		R-G-M	Erosion control practices not needed			
B	1		R-G-M-M	R-G-M	R-G-M-M	Practice not recommended	
	2		R-G-M-M-M	R-G-M	R-G-M-M		
C	1		G-M-M-M-M	R-G-M-M	R-G-M-M		
	2						
	3						
D	1						
	2						
	3						
E	1,2					Permanent pasture or woodland	
	3,4						
F	1,2						
	3,4						

\* For an explanation of Land Capability Classes, consult your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture. For example, an R-G-M-M-M rotation includes 1 year of row crop, 1 year of small grain, and 3 years of hay or rotation pasture in a 5-year period.

#### OTHER MANAGEMENT SUGGESTIONS

Because of Rodman's shallow depth to gravel, it is not very well adapted to woodland, although limited areas may be used for this purpose. It is better used for permanent pasture or rotation pasture or hay. Some areas may also be used for wildlife.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa and 4 to 6 pounds of northern bromegrass per acre. Another is 6 pounds of broadleaf birdsfoot trefoil and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately stocked, existing stands of desirable species such as black oak, white oak, bur oak, and northern pin oak will grow up to 200 board feet per acre per year when properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of Austrian pine, jack pine, and red cedar, if properly managed, will produce fence post material in 15 to 20 years and small saw logs in about 40 years.
5. Scotch, red, and white pine may be planted for Christmas trees.

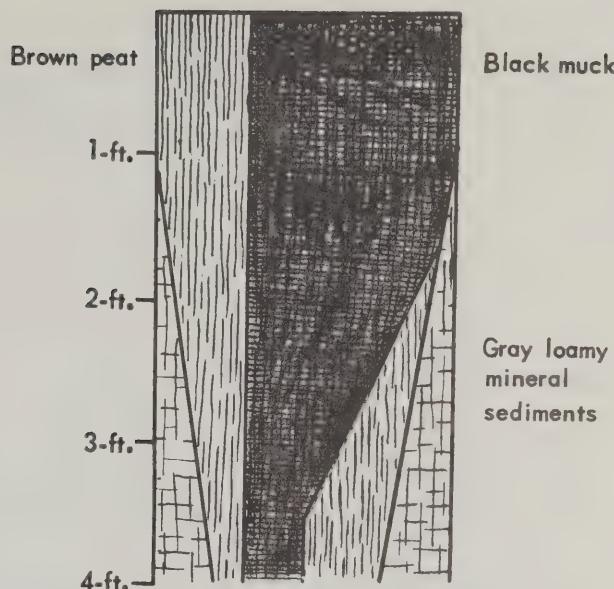
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPES:\*

- 97 and 97L HOUGHTON PEAT
- 103 and 103L HOUGHTON MUCK
- 210 and 210L LENA MUCK
- 324 and 324L LENA PEAT

Moderately dark to very dark-colored, very poorly drained organic soils. This group includes deep organic soils and also shallow organic soils underlain with medium-textured mineral material. The letter "L" indicates that medium-textured mineral material occurs at a depth of 10 to 36 inches. The soil type number used alone indicates that the organic material is more than 3 feet thick. These soils usually occur in depressional areas such as old lakebeds, but are found occasionally in seepy areas on sloping topography. In Houghton and Lena muck the organic matter is black and fairly well decomposed and in Houghton and Lena peat the organic matter is less decomposed, containing fibrous plant remains which often give a brown color to the soil mass. Snail shell fragments often occur on the surface and throughout the profile of Lena muck and peat.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major agricultural problems on these soils are providing adequate drainage and maintaining fertility.*

#### Drainage

These soils must be drained before they can be cropped. This is often a problem, however, since Houghton and Lena usually occupy low depressional areas where drainage outlets are not readily available. Tile or corrugated pipe may be used, if outlets can be secured through the use of drainage ditches and if precautions are taken to keep the tile or pipe from getting out of line. If areas have been recently drained with ditches, allow a couple of years for subsidence or settling before installing a tile system. In draining these soils, there is always a danger of overdrainage. If used, drainage ditches and tile should lower the water table to a depth of 35 or 40 inches. Dams should be used on outlet ditches to control water level and allow for flooding during periods when crops are not being grown.

Where there is less than 30 inches of muck or peat over mineral material, fewer precautions are needed to obtain adequate drainage with tile. Peats and mucks which occur in seepy spots on slopes may be adequately drained by intercepting the water between its source and the point where it emerges on the surface.

#### Fertility and Maintenance of Tilth

Limestone is not needed on these soils since normally Houghton is neutral and Lena is calcareous or has an excess of lime. Houghton and Lena often occur in complex patterns; therefore, calcareous spots often occur in Houghton and neutral spots in Lena. Both Lena and Houghton are low in available potassium and available phosphorus. The amount of potash and phosphate to apply should be based on soil tests and past fertilization. Superphosphate rather than rock phosphate should be used to correct phosphate deficiencies.

Nitrogen is not usually needed, but small amounts are recommended for leafy crops such as celery or lettuce.

On some vegetable crops it may be profitable to supply some of the minor elements. Minor elements most likely to be deficient are magnesium, zinc, boron, manganese, and copper.

\* The soil types in this group are included in Land Capability Class    
For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

Houghton and Lena are very friable and easy to cultivate. In large areas, due to the spongy condition of the peat or muck, crawler type tractors and wide-wheeled machinery may be desirable. These soils should be compacted by rolling so that seeds will germinate faster and organic material will decompose more slowly.

#### **Erosion Control**

Water erosion is not usually a problem but wind erosion may occur on overdrained areas. Wind erosion may be controlled by raising the water table or by planting barriers of trees or strips of grain.

#### **Cropping Program and Conservation Practices**

Mucks and peats are well adapted to growing certain vegetable crops such as onions, tomatoes, celery, and cabbage. Of the farm crops, corn and hay are better adapted than small grains. Soybeans and clovers tend to grow very rank and lodge badly. No specific crop rotation is suggested for these soils.

Crop residues should not be burned since muck and peat may become ignited and burn for long periods of time.

The productivity of these soils is highly variable depending on season, drainage, depth of organic matter, and the fertilizing program followed.

#### **OTHER MANAGEMENT SUGGESTIONS**

Some drained and many undrained areas are best suited for permanent pasture; other wet areas may be better suited for wildlife. The following suggestions are for such areas.

#### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

#### **Wildlife**

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:<sup>\*</sup>

97C and 97S HOUGHTON PEAT

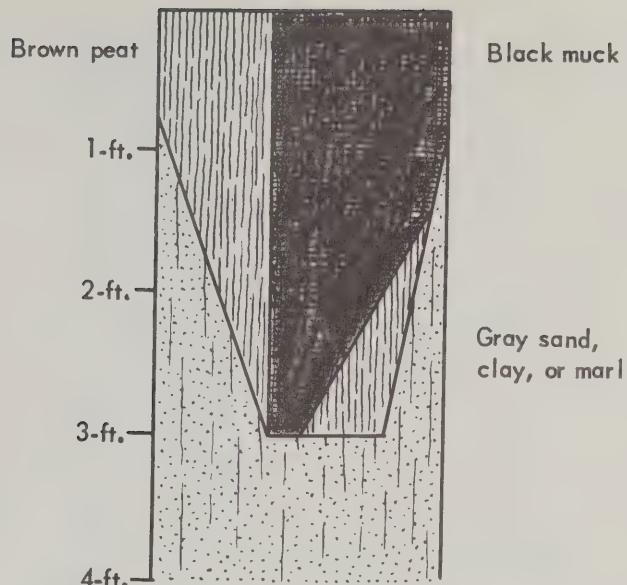
103C and 103S HOUGHTON MUCK

210C and 210S LENA MUCK

312 EDWARDS MUCK

324C and 324S LENA PEAT

Very dark-colored organic soils underlain at variable depths with gravel and sand, clay, or marl. The letter "C" indicates fine-textured material occurring at a depth of 10 to 36 inches; and the letter "S" indicates coarse-textured material at the same depth. Edwards muck is underlain with calcareous marl at a depth of 10 to 36 inches. These soils usually occur in depressional areas such as old lakebeds, but are occasionally found in seepy areas on sloping topography. Snail shell fragments often occur on the surface and throughout the profile of Lena muck and peat.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

These soils are not well suited for use as cropland. The muck is shallow, the underlying material is unfavorable, and obtaining adequate drainage may be difficult.

### OTHER MANAGEMENT SUGGESTIONS

These soils are better adapted to permanent pasture or wildlife than to cropping. The degree of wetness, type of underlying material, depth of muck, and your preference will determine your choice between these two uses. The following recommendations apply.

#### *Permanent Pasture*

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canarygrass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

\* The soil types in this group are included in Land Capability Class    
For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## ***Wildlife***

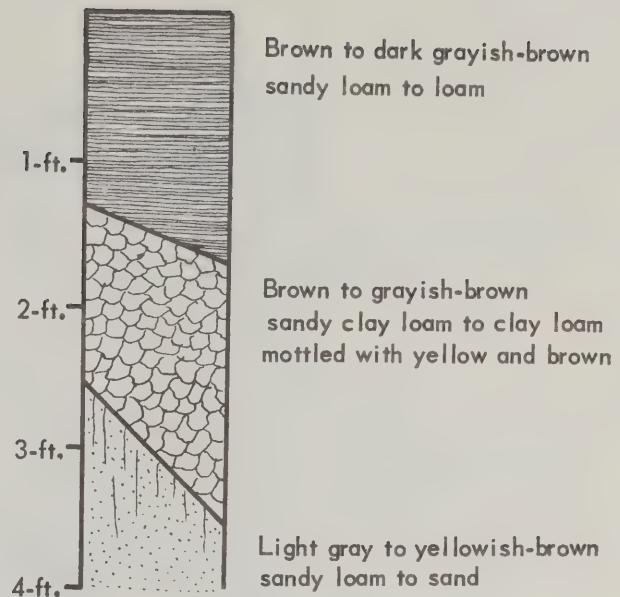
1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

### 102 LaHOGUE LOAM

### 156 RIDGEVILLE SANDY LOAM

Dark-colored, imperfectly drained soils having sandy loam to loam surfaces and sandy clay loam to clay loam subsoils underlain with sandy outwash material. Ridgeville and LaHogue occur on level to gently sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining fertility are the more important problems on these soils.*

### Drainage

For maximum yields, drainage is often needed. LaHogue and Ridgeville have moderate permeability and sandy substrata. Tile will function readily in LaHogue if tile lines are spaced 80 to 100 feet apart at a depth of 3 feet. Drainage ditches are usually recommended for Ridgeville. In providing artificial drainage, be careful not to lower the water table below root depth in dry years.

### Fertility and Maintenance of Tilth

Under virgin conditions, Ridgeville and LaHogue are usually medium acid and low to medium in available phosphorus and in available potassium. Moderate amounts of fertilizer should be applied frequently rather than large amounts occasionally. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

For good crop growth, organic matter and nitrogen must be added frequently, especially in Ridgeville, since decomposition is rapid and it is impossible to build up a reserve supply in sandy soils.

Addition of organic matter will also increase the water- and nutrient-holding capacity and maintain favorable tilth. Ridgeville is easy to cultivate, but is a little too loose and sandy to have the most desirable tilth.

### Erosion Control

Water erosion is not a problem, but occasionally wind erosion may occur. Such erosion can be controlled by keeping a vegetative cover on the ground as much as possible.

### Cropping Program and Conservation Practices

A good crop rotation should include winter cover crops which will add organic matter, reduce leaching, and control wind erosion. On level land which has favorable tilth, the most intensive rotation recommended is an R-R-G-M. When the tilth is considered relatively unfavorable, an R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

Most Intensive Rotation Recommended for Soil Types 102 and 156 Occurring on Different Slopes and With Varying  
Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land cap-ability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-G-M	Erosion control practices not needed			
B	+, ++, 0, 1		R-R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G-M	
C	0, 1		R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

The average crop yields per acre to be expected on level land under a moderately high level of management are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Ridgeville	56	43	23	22
LaHogue	66	45	24	25

#### OTHER MANAGEMENT SUGGESTIONS

Although most of the Ridgeville and the LaHogue is used for cropland, limited areas may be used for other purposes. The following recommendations apply to such areas.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

##### **Wildlife**

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

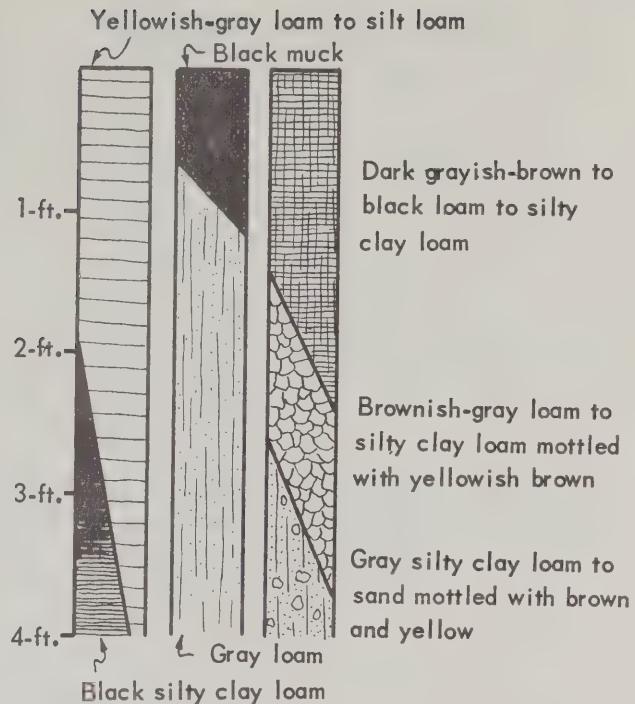
103LA1 HOUGHTON MUCK

125 SELMA LOAM

152 DRUMMER SILTY CLAY LOAM

296 WASHTENAW SILT LOAM

Poorly-drained soils occurring on depressional to slightly sloping topography. Selma (right diagram) has a dark-colored loam surface and a loam to silty clay loam subsoil. It is formed from loamy to sandy outwash. Drummer (also right diagram) has a dark-colored silty clay loam surface and a clay loam to silty clay loam subsoil. It is formed from medium-textured outwash or till. Houghton muck (center diagram) has 7 to 14 inches of black muck underlain with loamy mineral sediments. Washtenaw (left diagram) is formed from 24 inches or more of light to moderately dark-colored loam to silt loam material, washed in from surrounding slopes, overlying a dark-colored mineral soil.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage, maintaining fertility, and maintaining desirable tilth are the major problems on this group of soils.*

### Drainage

Providing adequate drainage is a first requirement on these soils. Since they have moderate permeability, tile will function well if adequate outlets are available. On Drummer, placing the tile 4 feet deep and spacing the lines 100 to 120 feet apart is recommended. Where sloping areas are wet because of springs, it is advisable to use tile to intercept the water between its source and the point where it emerges on the surface. There may be an installation problem in tiling Selma if the underlying material is quite sandy. Drainage ditches may be more practical in such cases. Since Houghton and Washtenaw often occur in depressions, surface inlets to the tile line are frequently necessary to dispose of concentrated runoff.

### Fertility and Maintenance of Tilth

Under virgin conditions, Selma, Drummer, and Houghton are neutral to slightly acid. Drummer is low to medium in available phosphorus and high in available potassium. Washtenaw is quite variable in available phosphorus and potassium, depending upon the kind of local wash deposited on the surface. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

Although Selma, Drummer, and Houghton are high to very high in organic-matter content, these soils need occasional additions of organic matter to supply nitrogen for good crop growth. Washtenaw is low to moderately low in organic-matter content, and, therefore, responds very well to frequent additions of organic matter and nitrogen.

Growing and plowing under legume sods will help to maintain favorable tilth, to improve the functioning of tile, and to keep the subsoil favorable for good air, water, and root movement. If Drummer is tilled when wet, it tends to become cloddy on the surface and compacted below the plow layer.

### Erosion Control

Erosion is not a problem since these soils usually occur on level topography. Where Drummer exists in natural drainageways, sod waterways are desirable if any erosive action is evident.

## Cropping Program and Conservation Practices

On level land which has favorable soil tilth, the most intensive rotation recommended is an R-R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. The following table gives recommended rotations and practices for other slopes and depths of topsoil.

The Most Intensive Rotations Recommended for Soil Types 103LA1, 125, 152, and 296 Occurring on Different Slopes and With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+,++,0,1		R-R-R-G <sub>x</sub>	Erosion control practices not needed		
B	+,++,0,1		R-R-R-R-G-M	Practices not recommended		
C	+,++,0,1		R-R-G-M-M			
D	+,++,0,1		R-G-M-M-M-M			

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = rotation pasture or hay. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of rotation pasture or hay in a 5-year period.

The average crop yields per acre to be expected on level areas under a moderately high level of management are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Drummer	70	49	25	28
Selma	63	43	22	24
Houghton and Washtenaw		Variable, but usually lower than above.		

## OTHER MANAGEMENT SUGGESTIONS

Although nearly level, productive soils such as these are generally used for cropland, you may prefer to use limited areas for other purposes. The following recommendations are made for permanent pasture and wildlife.

### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and 1/2 pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

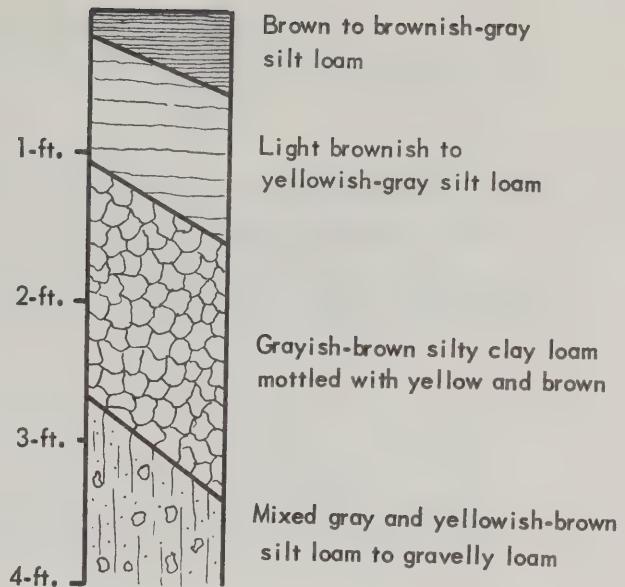
### Wildlife

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from fire and grazing.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 132 STARKS SILT LOAM

Light-colored, imperfectly drained soil having a silt loam surface with a silty clay loam subsoil. Starks is formed from neutral, medium-textured outwash and occurs on level to gently sloping topography.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining fertility are important problems on this soil.*

#### **Drainage**

Starks has moderate to moderately slow permeability, but tile will function satisfactorily under good management. Tile lines should be spaced 80 to 100 feet apart at a depth of 3 feet. Drainage can often be obtained by a few well-placed surface ditches.

#### **Fertility and Maintenance of Tilth**

Under virgin conditions, Starks is medium acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping systems to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Starks is low in organic-matter content. It responds very well to regular additions of organic matter and nitrogen in the form of leguminous crop residues, animal manure, commercial nitrogen, or a combination of these sources.

The addition of organic matter will also help to maintain favorable air and water movement and improve functioning of tile.

#### **Erosion Control**

Erosion is very seldom a problem.

#### **Cropping Program and Conservation Practices**

On level land which has favorable soil tilth, the most intensive crop rotation recommended is an R-R-R-G-M<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M-M rotation is recommended. If the soil exists on slopes or has been subjected to erosion, consult the following table for recommended rotations and practices.

Most Intensive Crop Rotations Recommended for Soil Type 132 Occurring on Different Slopes and With Varying Depths to

Subsoil

(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	++,0,1		R-R-R-G-M <sub>x</sub>	Erosion control practices not needed		
B	++,0,1 2 3		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>
			R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-R-G-M <sub>x</sub>
			R-R-G-M-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>
C	1 2		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>
			R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>

\* For explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grains; M = rotation pasture or hay; M<sub>x</sub> = portion of meadow is returned by plowing under. For example, an R-G-M-M rotation includes 1 year of row crop, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected on level areas under a moderately high level of management are 56 bushels of corn, 41 bushels of oats, 23 bushels of wheat, and 22 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although Starks is good productive cropland if adequately drained, limited areas may be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Adequately-stocked, existing stands of desirable species, such as ash, basswood, black walnut, red oak, white oak, sugar maple, and black cherry will grow up to 500 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Norway spruce and white pine may be planted for Christmas trees.
4. Protect from fire and grazing.

##### Wildlife

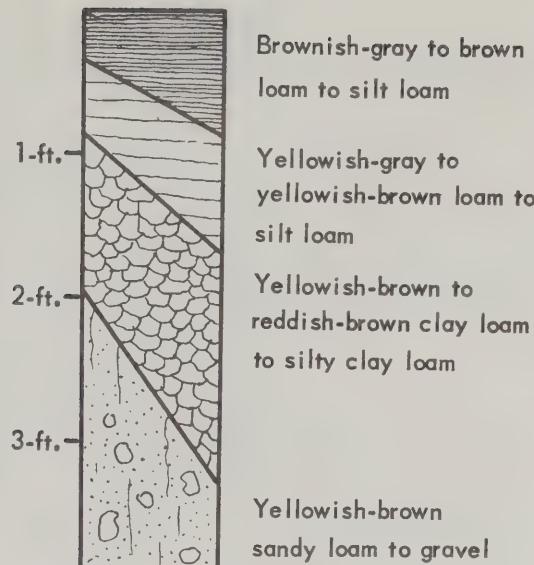
1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 137 ELLISON LOAM TO SILT LOAM
- 325 DRESDEN LOAM TO SILT LOAM
- 327 FOX LOAM TO SILT LOAM
- 327-323 FOX-CASCO COMPLEX
- 346 DOWAGIAC LOAM TO SILT LOAM
- 361 LAPEER LOAM

Light-colored (Ellison, Fox, Casco, and Lapeer) to moderately light-colored (Dresden and Dowagiac), well-drained soils having loam to silt loam surfaces and clay loam to silty clay loam subsoils. Except for Lapeer and the Fox-Casco complex, which occur on moderately to steeply sloping topography, these soils occur on nearly level to moderately sloping topography. Lapeer is generally formed from 6 to 12 inches of silty material overlying sandy loam till which is calcareous in the lower part.

In some areas the silty material is less than 6 inches or entirely lacking. Ellison and Dowagiac are formed from thin silt loam to loam material over coarse, loose, outwash sands. Dresden and Fox are formed from 24 to 40 inches and Casco from less than 24 inches of silt loam or loam material overlying coarse, calcareous, gravelly drift. Because depth to gravel is variable in areas of Fox and Casco, these soils are often indicated as complexes. Occasionally the soil numbers 325, 327, and 327-323 are followed with the letter (S), which indicates the substrata contain more sand and less gravel than is normal.



Brownish-gray to brown loam to silt loam

Yellowish-gray to yellowish-brown loam to silt loam

Yellowish-brown to reddish-brown clay loam to silty clay loam

Yellowish-brown sandy loam to gravel

### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Conserving moisture, controlling erosion, and maintaining fertility are the major problems on this group of soils.*

#### Drainage

These soils have adequate drainage; in fact, excessive drainage is a problem.

#### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are slightly to medium acid, low to medium in available phosphorus, and medium to high in available potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

The organic-matter content of these soils is low to moderately low. They respond well to regular additions of organic matter and nitrogen in the form of crop residues, manures, or commercial nitrogen.

If erosion has not been severe, these soils usually have favorable tilth which can be maintained by following the recommended rotations.

#### Erosion Control

Even though these soils are porous and will absorb a large amount of water, conservation practices and a good rotation must be used to control erosion and runoff on the sloping areas. If these soils are seriously eroded the crop yields will be greatly reduced.

#### Cropping Program and Conservation Practices

On level land which has no erosion problem, the most intensive rotation recommended is an R-R-G-M<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-G-M-M rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

The Most Intensive Rotations Recommended for Soil Types 137, 325, 327, 327-323, 346, and 361 Occurring on  
 Different Slopes and With Varying Depths to Subsoil  
 (See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-G-M <sub>x</sub>	Erosion control practices not needed			
B	0,1		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	2		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	3		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
C	1		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	2		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	3		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
D	1		G-M-M-M-M	R-G-M-M	R-R-G-M-M	R-R-G-M-M	
	2		G-M-M-M-M	R-G-M-M	R-R-G-M-M	R-R-G-M-M	
	3		G-M-M-M-M	R-G-M-M	R-R-G-M-M	R-R-G-M-M	
	4		Permanent pasture or woodland				
E	1		G-M-M-M-M	G-M-M-M	R-R-G-M-M	Not recommended	
	2		G-M-M-M-M	G-M-M-M	R-G-M-M-M		
	3						
F	1,2,3		Permanent pasture or woodland				

\* For an explanation of Land Capability Class, consult your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

In dry years, drouth is a problem and will reduce the yields considerably. The average yields to be expected under a moderately high level of management are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Ellison, Fox-Casco complex, and Lapeer	50	36	21	20
Dresden, Fox, and Dowagiac	54	40	23	20

#### OTHER MANAGEMENT SUGGESTIONS

Many areas are best adapted to permanent pasture, woodland, or wildlife. The following recommendations apply to such areas and any other areas you may wish to use for these purposes.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Adequately stocked, existing stands of desirable species such as white oak, black oak, black walnut, red oak, sugar maple, and black cherry will grow up to 400 board feet per acre per year when properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of Austrian red and white pine, if properly managed, will produce fence post material in 15 to 20 years and small saw logs in about 40 years.
5. Scotch and red pine may be planted for Christmas trees.

##### Wildlife

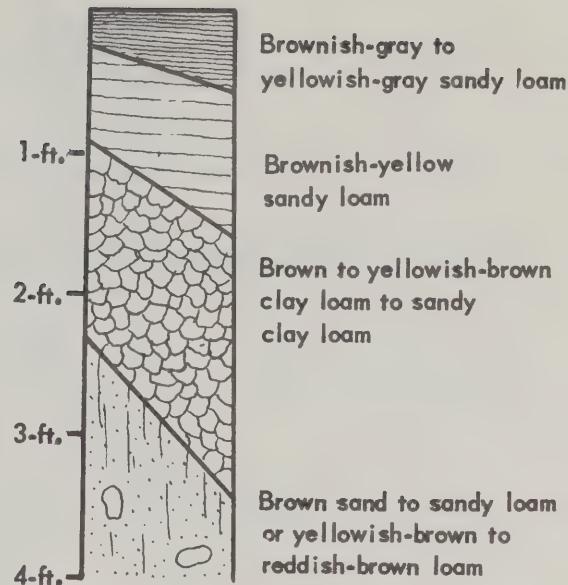
1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPES:

### 144 ALVIN SANDY LOAM

### 205 METEA SANDY LOAM

Light-colored, well-drained soils having sandy loam surfaces, clay loam to sandy clay loam subsoils and occurring on nearly level to moderately sloping topography. Alvin is formed from sandy outwash and Metea is formed from 18 to 40 inches of sandy material underlain with calcareous loam till.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on these soils are overcoming drouthiness, controlling erosion, and maintaining fertility.*

### Drainage

Drainage is not a problem because these soils are naturally well drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping systems to be used. Your farm adviser can help you plan a sound program of liming and fertilizing. Since these soils are sandy, moderate amounts of fertilizer should be applied frequently, rather than large amounts occasionally.

Since the organic-matter content of these soils is low, they respond very well to regular additions of organic matter and nitrogen. In addition to supplying nitrogen, organic matter absorbs applied fertilizers and releases them slowly. It also improves the surface, which is a little too sandy to be the most desirable.

### Erosion Control

On the more sloping areas, water erosion may be a problem. On the level areas, wind erosion may need to be controlled. Wind erosion is most severe on fall-plowed or bare ground. The most effective method of controlling water or wind erosion is to provide good vegetative cover as much of the year as possible.

### Cropping Program and Conservation Practices

Alvin and Metea produce fair yields in seasons of good rainfall if they are properly treated and if a good rotation is used which will supply enough nitrogen and organic matter. In dry years, corn and soybeans are apt to suffer from lack of moisture. Winter cover crops should be used whenever possible on sandy soils to add organic matter and reduce wind erosion. On level land which has favorable tilth and no water erosion problem, the most intensive rotation recommended is an  $R_x-R_x-G-M$ . When the tilth is considered relatively unfavorable, an  $R-G-M-M$  rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

**The Most Intensive Rotation Recommended for Soil Types 144 and 205 Occurring on Different Slopes and With,  
Varying Depths to Subsoil**  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R <sub>x</sub> -R <sub>x</sub> -G-M	Erosion control practices not needed			
B	+, ++, 0, 1 2		R <sub>x</sub> -R <sub>x</sub> -G-M R-G-M	R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M	R-R-G-M-M-M R-R-G-M-M-M	R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M	
C	0, 1 2 3		R-G-M-M	R-G-M	R-R-G-M-M-M	R <sub>x</sub> -R <sub>x</sub> -G-M R <sub>x</sub> -R <sub>x</sub> -G-M	
			R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M	
			R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M		
D	0, 1 2 3		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-G-M	
			G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	
			G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	
E	0, 1 2 3		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	Not recommended	
			G-M-M-M-M	G-M-M-M-M	G-M-M-M-M		
F	1 2, 3		Permanent pasture or woodland				

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; R<sub>x</sub> = winter cover crop sown in or after row crop; G = small grain; M = hay or rotation pasture. For example, an R-G-M-M rotation includes 1 year of row crop, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Metea	46	35	20	19
Alvin	41	32	18	16

#### OTHER MANAGEMENT SUGGESTIONS

As shown in the foregoing table, some areas are better suited for woodland or permanent pasture than for crops; they may also be used for wildlife. The following recommendations apply to these areas, as well as to any others you may want to use for such purposes.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately-stocked, existing stands of desirable species such as white oak, black oak, and northern red oak will grow up to 400 board feet per acre per year when properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of red pine and white pine, if properly managed, will provide fence post material in 6 to 10 years and small saw logs in about 25 years.
5. Scotch and red pine may be planted for Christmas trees.

##### **Wildlife**

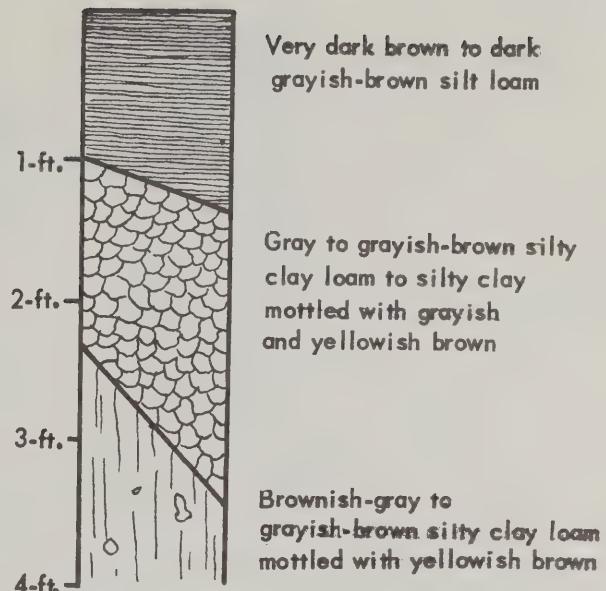
1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Establish a three-row pine shelterbelt or multiflora rose fence where it is needed to control wind erosion and provide wildlife travel lanes.

## USE AND MANAGEMENT OF SOIL TYPES:

### 146 ELLIOTT SILT LOAM

### 189 MARTINTON SILT LOAM

Dark-colored, imperfectly drained soils having silt loam surfaces, silty clay loam to silty clay subsoils, and silty clay loam substrata. Elliott is formed from thin loess over silty clay loam till and occurs on very gently to moderately sloping topography. Martinton is formed from silty clay loam outwash or lakebed sediments and occurs on level to nearly level topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on these soils are erosion control and drainage.*

### Drainage

Artificial drainage is usually needed on slopes of less than 2 percent and for seepy areas on greater slopes. These soils are moderately slowly permeable, but because of the good structure of the subsoil, tile will function satisfactorily under good management. For adequate drainage, tile lines should be spaced 40 to 55 feet apart at a depth of 3 feet. In seepy areas, tile should be placed to intercept the water between its source and the point where it emerges on the surface.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are generally medium to slightly acid, low to medium in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

These soils respond well to good management. Even though they are high in nitrogen-supply organic matter, they need additions of nitrogen for maximum yields. This may be supplied in the form of manure, leguminous crop residues, or commercial nitrogen. When a catch crop is used, commercial nitrogen or manure should be supplied.

Adding organic matter not only maintains the nitrogen supply of the soil, but also helps tile to function more satisfactorily, reduces runoff, and helps maintain favorable tilth and good moisture and air relationships.

### Erosion Control

Erosion is a serious problem on the more sloping areas of Elliott since it has a moderately fine-textured subsoil which water does not penetrate easily. Contour farming, terracing, and leaving crop residues on the surface during the fall, winter, and spring help greatly to reduce runoff and erosion.

### Cropping Program and Conservation Practices

For sustained production, crop rotations should include deep-rooting legumes and fibrous-rooted grasses. On level land which has favorable soil tilth and no erosion problem, the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended.

As either slope or erosion increases, a less intensive rotation should be used as shown by the following table.

The Most Intensive Rotations Recommended for Soil Types 146 and 189 Occurring on Different Slopes and With  
Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-G <sub>x</sub>	Erosion control practices not needed			
B	1		R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
	2		R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
	3		R-R-G-M-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>	
C	1		R-G-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>	
	2		R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>	
	3		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-G <sub>x</sub>	
D	1		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
	2		G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M	
	3		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a five-year period.

The average crop yields per acre to be expected on nearly level to gently sloping topography under a moderately high level of management are 64 bushels of corn, 49 bushels of oats, 25 bushels of wheat, and 25 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although these soil types are used primarily for cropland, you may wish to use certain areas for permanent pasture, woodland, or wildlife. For these purposes the following recommendations apply.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

##### **Wildlife**

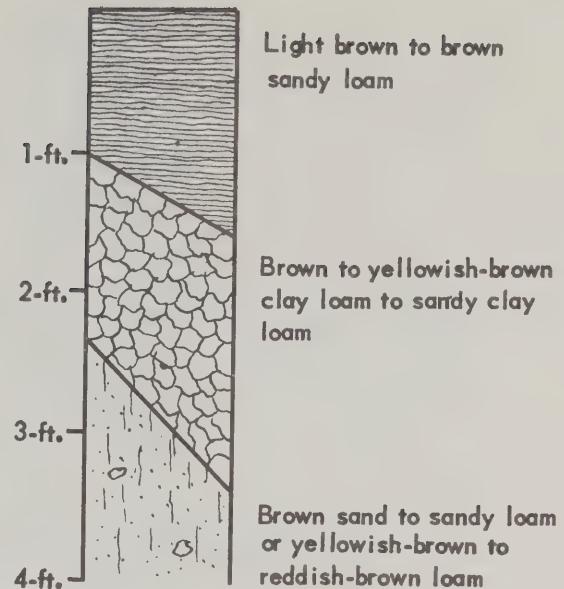
1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

### 150 ONARGA SANDY LOAM

### 204 AYR SANDY LOAM

Moderately dark-colored, well-drained soils having sandy loam surfaces and clay loam to sandy clay loam subsoils. Onarga is formed from sandy outwash and occurs on level to moderately sloping topography. Ayr is formed from 18 to 40 inches of sandy material underlain with calcareous loam till and occurs on nearly level to moderately sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Overcoming drouthiness, controlling erosion, and maintaining fertility are major problems on these soils.*

### Drainage

Drainage is not a problem because these soils are naturally well drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low to medium in available phosphorus, and medium in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing. On sandy soils such as these, moderate amounts of fertilizer should be applied frequently, rather than large amounts occasionally.

The organic-matter content of these soils is moderately high. For good crop growth, organic matter and nitrogen should be supplied regularly. Additions of organic matter will not only supply nitrogen but will also help the soil to hold fertilizers and release them slowly.

Onarga and Ayr have loose surfaces because of the high sand content. Deep-rooted legumes and fibrous-rooted grasses in the rotation will help to improve the tilth.

### Erosion Control

On the more sloping areas, water erosion may be a problem. However, on these sandy-surfaced soils wind erosion is a greater danger. It can best be controlled by providing maximum vegetative cover and by strip cropping at right angles to the direction of the prevailing winds.

### Cropping Program and Conservation Practices

Ayr and Onarga produce fairly good yields in seasons of good rainfall if they are properly treated and if a good rotation is used which will supply enough organic matter and nitrogen. In dry years, corn and soybeans are apt to suffer from lack of moisture. Winter cover crops should be used whenever possible on sandy soils to add organic matter and reduce wind erosion. On level land which has favorable tilth and no water-erosion problem, the most intensive rotation recommended is an R-R-G-M<sub>X</sub>. When the tilth is relatively unfavorable, an R-G-M rotation is recommended to improve the surface condition. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

The Most Intensive Rotations Recommended for Soil Types 150 and 204 Occurring on Different Slopes and With  
Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for-				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-G-M <sub>x</sub>	Erosion control practices not needed			
B	0,1 2		R-R-G-M <sub>x</sub>	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-R-G-M <sub>x</sub>	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
C	0,1 2 3		R-R-G-M-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
D	0,1 2 3		R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M-M	
			R-G-M-M-M	R-G-M-M	R-R-G-M-M-M	R-G-M	
			G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	R-G-M-M-M	
E	0,1 2		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M	Not recommended	
			G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M		

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are:

	Corn bu.	Oats bu.	Wheat bu.	Soybeans bu.
Ayr	57	43	23	22
Onarga	49	37	21	20

#### OTHER MANAGEMENT SUGGESTIONS

Most of the areas will be used for cropland but you may wish to use some for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 6 to 10 years and small saw logs in about 30 years.
2. Scotch and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

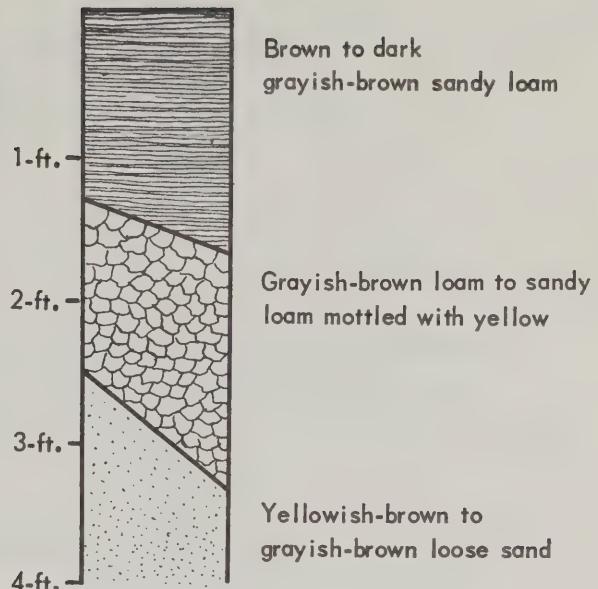
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Establish a three-row pine shelterbelt or multiflora rose fence where it is needed to control wind erosion and provide wildlife travel lanes.

## USE AND MANAGEMENT OF SOIL TYPE:

### 172 HOOPESTON SANDY LOAM

A dark-colored, imperfectly drained soil having a sandy loam surface and a sandy loam to loam subsoil. Hoopeston is formed from loose outwash sands and occurs on level to very gently rolling topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are maintaining soil fertility and providing drainage.*

### Drainage

For maximum yields, drainage is occasionally needed. Open ditches are usually recommended, since these soils have moderate permeability and sandy substrata. In providing drainage, precaution is needed to keep from lowering the water table below root depth in dry years.

### Fertility and Maintenance of Tilth

Under virgin conditions, Hoopeston is usually medium to slightly acid and medium to low in available phosphorus and potassium. Moderate amounts of fertilizer should be applied frequently, rather than large amounts occasionally. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

For good crop growth, organic matter should be added frequently, since it decomposes rapidly on sandy soils and a reserve supply cannot be built up. When a catch crop is used, commercial nitrogen should be applied.

Additions of organic matter will not only build up the nitrogen supply but also increase the water- and nutrient-holding capacity and help to maintain favorable tilth. Hoopeston is easy to cultivate, but it is a little too sandy to have the most desirable tilth.

### Erosion Control

Water erosion is not a problem, but wind erosion may occur occasionally. Such erosion can be controlled by keeping a vegetative cover on the ground as much as possible.

### Cropping Program and Conservation Practices

A good crop rotation, which includes winter cover crops, will not only add organic matter but will also reduce wind erosion and drought damage. On level land which has favorable tilth, the most intensive rotation recommended is an R-G-M or an  $R_x - R_x - G - M$ . When the tilth is considered relatively unfavorable, an R-G-M-M rotation is recommended. For other recommendations see the following table.

The Most Intensive Rotation Recommended for Soil Type 172 Occurring on Different Slopes and With Varying Depths to Subsoil

(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			Wind erosion control
			No practice	Contouring	Strip cropping	
A	+, ++, 0, 1		R-G-M	Practices not recommended		R <sub>x</sub> -R <sub>x</sub> -G-M
B	+, ++, 0, 1		R-G-M			R <sub>x</sub> -R <sub>x</sub> -G-M

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; R<sub>x</sub> = winter cover crop, sown in or after row crop; G = small grain; M = hay or rotation pasture. For example, an R-R-G-M rotation includes 2 years of row crop, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on level topography are 56 bushels of corn, 40 bushels of oats, 22 bushels of wheat, and 22 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although Hoopeston is generally used for cropland, limited areas may be used for other purposes. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

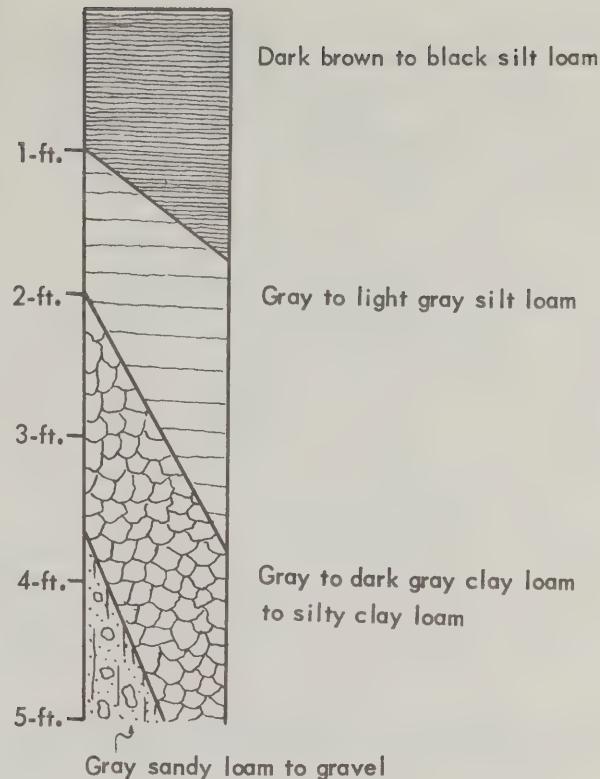
##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPE:\*

### 191 KNIGHT SILT LOAM

Moderately dark to dark-colored, imperfectly drained soil having a silt loam surface with a clay loam to silty clay loam subsoil. Knight is formed from silty material underlain with coarse-textured till or outwash and occurs on level to depressional topography.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are providing adequate drainage and maintaining fertility.*

#### Drainage

Knight has moderately slow permeability, but tile will function adequately under good management. If placed at a depth of 3 feet, tile lines should be spaced 80 to 100 feet apart for adequate drainage. Surface inlets to the tile and grass waterways will help to dispose of excess water quickly.

#### Fertility and Maintenance of Tilth

Under virgin conditions, Knight is medium to slightly acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Knight is high in organic matter. Nevertheless, organic matter should be added regularly in the form of manures and crop residues. This will not only supply nitrogen for good crop growth, but will also help tile function properly and will help maintain favorable tilth and good air and water relationships. When a catch crop is used, additional nitrogen should be supplied in the form of commercial fertilizers.

#### Erosion Control

Erosion is very seldom a problem on this soil. Occasionally it may receive deposits of material from higher ground.

\* This soil type is included in Land Capability Class

For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## **Cropping Program and Conservation Practices**

On level land which has favorable tilth, the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M<sub>x</sub> rotation is recommended.

The letters have the following meanings: R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G<sub>x</sub> rotation includes 2 years of row crops and 1 year of small grain seeded with legumes and plowed under the following spring before the corn is planted.

The average crop yields per acre to be expected under a moderately high level of management are 55 bushels of corn, 40 bushels of oats, 21 bushels of wheat, and 23 bushels of soybeans.

## **OTHER MANAGEMENT SUGGESTIONS**

Although this soil is very productive if adequately drained, limited areas may be used for permanent pasture or wildlife. The following recommendations apply to such areas.

### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses or legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

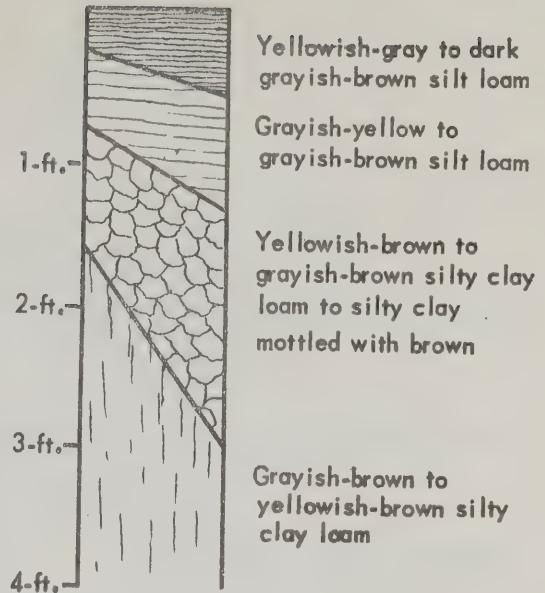
### **Wildlife**

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 194 MORLEY SILT LOAM

Light-colored, moderately well-drained to well-drained soil having a silt loam surface with a silty clay loam to silty clay subsoil and formed from thin loess over silty clay loam till. Morley occurs on moderate to steeply sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are controlling erosion and maintaining fertility.*

### Drainage

Drainage is usually not needed since this soil is moderately well to well-drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, this soil is medium to slightly acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Morley is low in organic-matter content. It responds well to regular additions of organic matter and nitrogen in the form of leguminous crop residues, animal manures, commercial nitrogen, or a combination of these sources.

The addition of organic matter will also help to maintain favorable tilth, maintain favorable air and water relationships, and improve root penetration.

### Erosion Control

Erosion is often a problem since Morley has moderately slow permeability, causing rapid runoff, and generally occurs on moderate to steep topography. Once the topsoil has been removed, the productivity of this soil is seriously and permanently reduced. To control erosion, a large percentage of grasses and legumes should be included in the rotation. Also, supporting practices such as grass waterways, contouring, strip cropping, and terracing should be used wherever practical. Catch crops should be used whenever possible to cover the surface during the fall, winter, and spring. All plowing should be done in the spring.

### Cropping Program and Conservation Practices

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-G-M<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M-M rotation is recommended. Rotations and practices recommended for other slopes and depths of surface soil are given in the following table.

The Most Intensive Crop Rotations Recommended for Soil Type 194 Occurring on Different Slopes and With Varying  
Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land cap-ability class*	Crop rotations recommended for--					
			No practice	Contouring	Strip cropping	Terracing		
A	0,1		R-R-G-M <sub>x</sub>	Erosion control practices not needed				
B	1		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>		
	2		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>		
C	1		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>		
	2		R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>		
	3		R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>		
D	1		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M		
	2		G-M-M-M-M	R-G-M-M-M-M	R-G-M-M	R-R-G-M-M		
	3		G-M-M-M-M	R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M		
E	0,1				G-M-M-M-M	R-G-M-M		
	2				G-M-M-M-M	R-G-M-M		
	3							
F	0,1							
	2							
	3							

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

If erosion control practices are used, the average crop yields per acre to be expected under a moderately high level of management on moderately sloping topography are 42 bushels of corn, 35 bushels of oats, 19 bushels of wheat, and 18 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

The steeper slopes of Morley are not adapted to crop production and should be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas, as well as to any others you may care to use for these purposes.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately-stocked, existing stands of desirable species, such as white oak, red oak, black oak, bur oak, ash, and black walnut will grow up to 500 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of red pine and white pine, if properly managed, will produce fence post material in 12 to 15 years and small saw logs in about 35 years.
5. Scotch and red pine may be planted for Christmas trees.

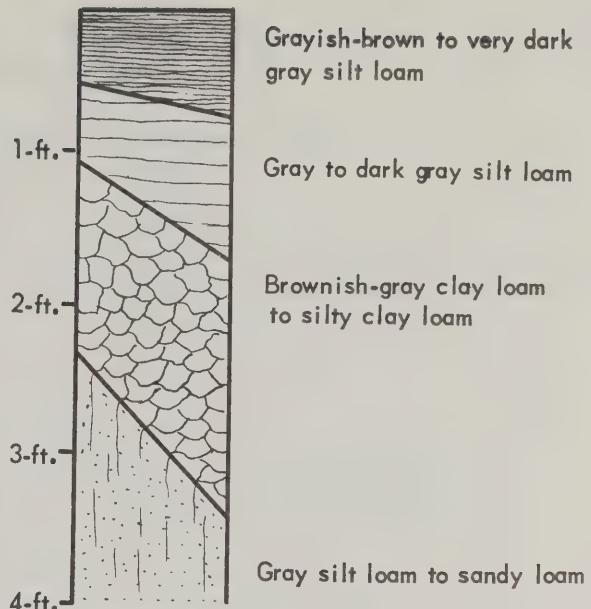
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the border of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 206 THORP SILT LOAM

A moderately dark-colored, imperfectly to poorly drained soil having a silt loam surface and a clay loam to silty clay loam subsoil. Thorp occurs on level to depressional topography and is formed from medium-textured outwash or loess underlain with silt loam to sandy loam outwash or till.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing drainage and maintaining fertility are major problems on this soil.*

### Drainage

Artificial drainage is usually needed. Thorp has slow to moderately slow permeability but tile will function fairly satisfactorily if outlets are available. Surface inlets to the tile line are frequently necessary to dispose of concentrated runoff.

### Fertility and Maintenance of Tilth

Under virgin conditions, this soil is medium to slightly acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

For good crop growth, nitrogen must be added regularly in the form of leguminous organic matter, animal manure, commercial fertilizers, or some combination of these sources. When a catch crop is grown, commercial nitrogen should be used.

Deep-rooting legumes and fibrous-rooted grasses not only provide nitrogen and fresh organic matter, but also help maintain good tilth and structure, which are conducive to better drainage.

### Erosion Control

Erosion is rarely a problem on Thorp.

### Cropping Program and Conservation Practices

On level land which has favorable tilth the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. For other recommendations see the following table.

The Most Intensive Rotations Recommended for Soil Type 206 Occurring on Different Slopes and With Varying Depths to Subsoil

(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+, ++, 0, 1		R-R-G <sub>x</sub>	Erosion control practices not needed		
B	0		R-R-G-M-M-M	Practices not recommended		

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M rotation is 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management are 56 bushels of corn, 41 bushels of oats, 22 bushels of wheat, and 24 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Some areas may be better adapted for permanent pasture or wildlife than for use as cropland. The following recommendations are made for such areas.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

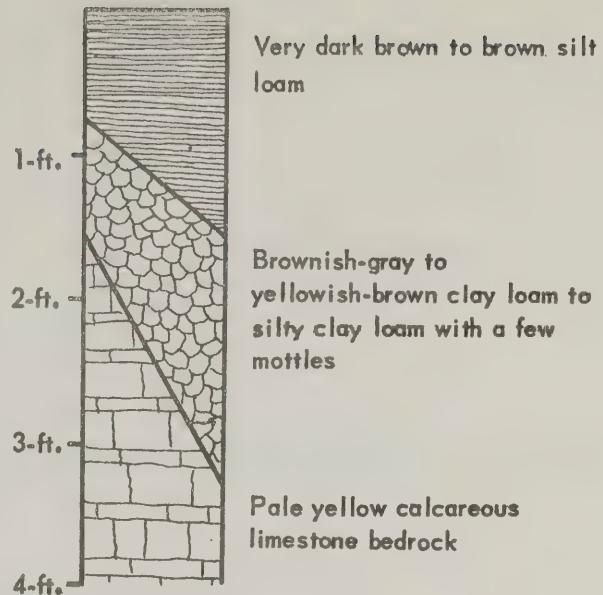
##### **Wildlife**

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 220 PLATTVILLE SILT LOAM

A dark-colored, moderately well-drained to well-drained soil having a silt loam surface and a clay loam to silty clay loam subsoil. Plattville is formed from 20 to 40 inches of medium-textured till or outwash directly underlain with limestone bedrock. Plattville occurs on very gently to moderately sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are controlling erosion and maintaining fertility.*

### Drainage

Drainage is not usually needed since Plattville is naturally moderately well to well-drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, Plattville is medium acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Organic matter and nitrogen should be added regularly to obtain maximum crop yields although Plattville is normally high in organic matter.

The tilth of Plattville is usually good and should be maintained at a desirable level.

### Erosion Control

Although erosion is not a serious problem on gentle slopes, the recommended rotations should be followed. On steeper slopes, erosion must be controlled by a good rotation and recommended practices. Since bedrock is so shallow, erosion will permanently reduce the productivity of this soil.

### Cropping Program and Conservation Practices

A rotation which includes deep-rooting legumes and fibrous-rooted grasses not only provides nitrogen and organic matter, but also helps to reduce erosion, maintain desirable tilth, and maintain favorable air and water movement.

On level land which has favorable soil tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G-M<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M-M rotation is recommended. Rotations and practices recommended are given in the following table.

The Most Intensive Rotation Recommended for Soil Type 220 Occurring on Different Slopes and With Varying Depths to Subsoil

(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	1		R-R-R-G-M <sub>X</sub>	Erosion control practices not needed		
B	1		R-R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-R-G-M <sub>X</sub>
C	1		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-R-G-M <sub>X</sub>
D	1		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>X</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

The average crop yields per acre to be expected under a moderately high level of management on gently sloping topography are 63 bushels of corn, 48 bushels of oats, 24 bushels of wheat, and 24 bushels of soybeans. If this soil is severely eroded, these yields will be considerably reduced.

#### OTHER MANAGEMENT SUGGESTIONS

This soil is generally used for cropland, but small areas may be used for permanent pasture, woodland, or wildlife. The following suggestions apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding, use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 10 to 12 years and small logs in about 35 years.
2. Scotch and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

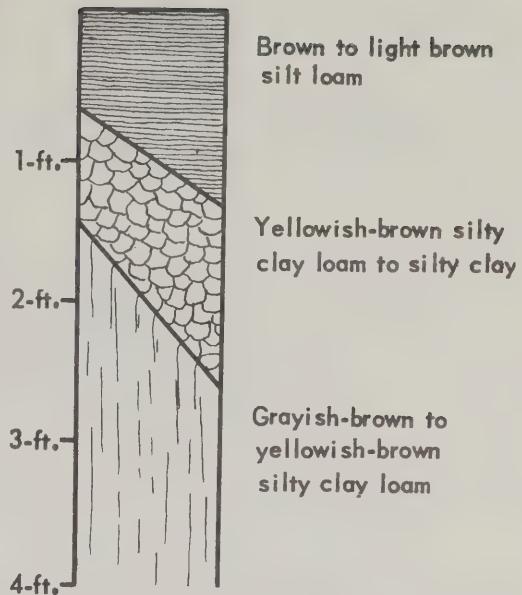
##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPE:

### 223 VARNA SILT LOAM

A moderately dark-colored, moderately well-drained to well-drained soil having a silt loam surface with a silty clay loam to silty clay subsoil. Varna is formed from thin loess over calcareous silty clay loam till and occurs on moderate to steep topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Controlling erosion and maintaining fertility are the major problems on this soil.*

### Drainage

Drainage is usually not needed since Varna is naturally moderately well to well-drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, Varna is slightly acid to neutral, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

The organic-matter content of Varna is normally high. However, for sustained production, organic matter and nitrogen should be maintained at a desirable level by regular additions of crop residues, animal manures, commercial nitrogen, or some combinations of these sources.

The addition of organic matter will also help to maintain favorable tilth, maintain favorable air and water relationships, and improve root penetration.

### Erosion Control

Erosion is often a problem since Varna has moderately slow permeability, causing rapid runoff, and generally occurs on moderate to steep topography. Once the topsoil has been removed, the productivity of this soil is seriously and permanently reduced. To control erosion, a large percentage of grasses and legumes should be included in the rotation. Also, supporting practices such as grass waterways, contouring, strip cropping, and terracing should be used whenever practical.

### Cropping Program and Conservation Practices

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M rotation is recommended. Rotations and practices recommended for other slopes and depths of topsoil are given in the following table.

The Most Intensive Crop Rotation Recommended for Soil Type 223 Occurring on Different Slopes and With Varying  
Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land cap-ability class*	Crop rotations recommended for--			
			No practice	Contouring	Strip cropping	Terracing
A	+,++,0,1		R-R-G <sub>x</sub>	Erosion control practices not needed		
B	+,++,0,1 2 3		R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>
			R-R-G-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>
			R-R-G-M-M	R-R-G <sub>x</sub>	R-R-G-M-M-M	R-R-G <sub>x</sub>
C	+,++,0,1 2 3		R-G-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>
			R-G-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G <sub>x</sub>
			R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-G <sub>x</sub>
D	1 2 3		R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M
			G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M-M
			G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M
E	0,1 2 3		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	Not recommended
			G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	
					Permanent pasture or woodland	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

If erosion control practices are used, the average crop yields per acre to be expected on moderately sloping topography under a moderately high level of management are 44 bushels of corn, 36 bushels of oats, 20 bushels of wheat, and 19 bushels of soybeans. On more sloping topography, corn and soybeans are not adapted.

#### OTHER MANAGEMENT SUGGESTIONS

The steeper slopes of Varna are not adapted to crop production and should be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas, as well as to any others you may care to use for these purposes.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa,  $\frac{1}{2}$  pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Plantations of red pine and white pine, if properly managed, will produce fence post material in 12 to 15 years and small saw logs in about 35 years.
2. Scotch and red pine may be planted for Christmas trees.
3. Protect from fire and grazing.

##### Wildlife

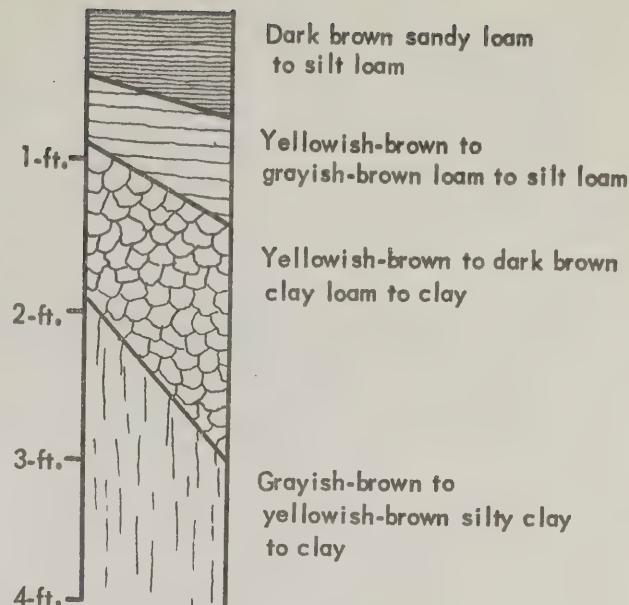
1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the border of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

### 228 EYLAR SILT LOAM

### 366 EYLAR SANDY LOAM

Light-colored, moderately well-drained soils with sandy loam to silt loam surfaces and silty clay loam to clay subsoils. Eylar (228) is formed from thin loess over calcareous silty clay to clay till and Eylar (366) is formed from 10 to 24 inches of sandy material over calcareous silty clay to clay till. Both occur on gently to strongly sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Controlling erosion, improving physical condition, and maintaining fertility are major problems on these soils.*

### Drainage

Drainage is not a problem since these soils are naturally moderately well drained.

### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are medium to slightly acid, low in available phosphorus, and medium to low in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

The organic-matter content is naturally low, so organic matter and nitrogen should be supplied regularly for good crop growth. The response to such treatment is very good.

The surface of EYLAR sandy loam (366) is a little too sandy to be the most desirable. On both soil types, a good crop rotation including regular additions of organic matter will not only add nitrogen, but also improve the tilth, improve air and water relationships, and provide better rooting conditions.

### Erosion Control

Since these soils often occur on sloping topography and have slow permeability, causing rapid runoff, a rotation must be used which will conserve the topsoil or surface. Once the topsoil is removed, the productivity is seriously and permanently reduced.

### Cropping Program and Conservation Practices

A good cropping program and proper conservation practices should be used to control erosion, increase water-holding capacity, maintain organic-matter content, maintain favorable tilth, and reduce runoff.

On level land with no erosion problem and with favorable tilth, the most intensive crop rotation recommended is an R-R-G-M. When the tilth is considered relatively unfavorable, an R-R-G-M-M rotation is recommended. Rotations and conservation practices for other slopes and depths of surface are given in the following table.

The Most Intensive Crop Rotation Recommended for Soil Types 228 and 366 Occurring on Different Slopes and With  
Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-G-M	Erosion control practices not needed			
B	0, 1 2		R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M-X	
			R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M-X	
C	0, 1 2 3		G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M-M	
			G-M-M-M-M	R-G-M-M	R-G-M-M	R-R-G-M-M	
			G-M-M-M-M	R-G-M-M-M	R-G-M-M	R-R-G-M-M	
D	0, 1 2 3		Permanent pasture or woodland				
			Permanent pasture or woodland				
			Permanent pasture or woodland				
E	0, 1 2 3		Permanent pasture or woodland				
F	0, 1		Permanent pasture or woodland				

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay or rotation pasture; M<sub>X</sub> = portion of meadow is returned by plowing down. For example, an R-G-M-M-M rotation includes 1 year of row crop, 1 year of small grain, and 3 years of hay or rotation pasture in a 5-year period.

If erosion control practices are used, the average crop yields per acre to be expected under a moderately high level of management on moderately sloping topography are 44 bushels of corn, 34 bushels of oats, 20 bushels of wheat, and 18 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

As shown by the foregoing table, some areas are better adapted to permanent pasture or woodland than to crops; these areas may also be used for wildlife. The following recommendations apply to these areas and any others you may wish to use for such purposes.

##### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa, 1/2 pound of Ladino clover, and 4 to 6 pounds of northern bromegrass per acre. Another is 2 to 3 pounds of red clover, 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### **Woodland**

1. Adequately-stocked, existing stands of desirable species, such as black oak and white oak, will grow up to 300 board feet per acre per year if properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.

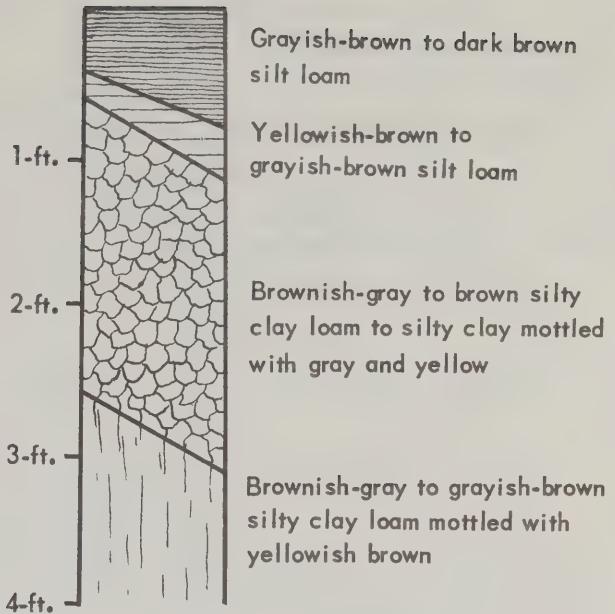
##### **Wildlife**

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in an area of bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the border of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 298 BEECHER SILT LOAM

Moderately dark-colored, imperfectly drained soil having a silt loam surface and a silty clay loam to silty clay subsoil. Beecher is formed from thin loess over silty clay loam till and occurs on very gently to moderately sloping topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major agricultural problems on this soil are controlling erosion, maintaining fertility, and providing drainage.*

### Drainage

Artificial drainage is usually needed on slopes of less than 2 percent and for seepy areas on steeper slopes. Beecher is moderately slowly permeable, but because of the good structure of the subsoil, tile will function satisfactorily under good management. Tile lines should be spaced 40 to 55 feet apart for adequate drainage. In seepy areas, tile should be placed to intercept the water between its source and the point where it emerges on the surface.

### Fertility and Maintenance of Tilth

Under virgin conditions, Beecher is medium acid, low to medium in available phosphorus, and medium to high in available potash. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Beecher is moderately low in nitrogen-supplying organic matter. For maximum yields, grasses and legumes should be plowed down and manure or commercial nitrogen applied.

To improve soil tilth and keep it favorable, you need not only to add organic matter regularly, but also to use a good rotation and avoid plowing or cultivating when the soil is wet. These steps will also reduce runoff and help the tile to function better.

### Erosion Control

Erosion is a serious problem on the more sloping areas since moisture moves moderately slowly into this soil and surface runoff is moderately rapid. Once the surface has been removed, the productivity is permanently and seriously reduced.

### Cropping Program and Conservation Practices

A good rotation must be used on Beecher for high, sustained production. Grass waterways should be maintained, and contour tillage and terraces used whenever possible. Crop residues should be left on the surface during fall and winter.

On level land which has favorable soil tilth and no erosion problem, the most intensive rotation recommended is an R-R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths to subsoil are given in the following table.

Most Intensive Rotations Recommended for Soil Type 298 Occurring on Different Slopes and With Varying  
Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-R-G <sub>x</sub>	Erosion control practices not needed			
B	1		R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
C	2		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-G-M-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
D	3		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
			G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
			G-M-M-M-M	R-G-M-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected on nearly level to gently sloping topography under a moderately high level of management are 51 bushels of corn, 39 bushels of oats, 21 bushels of wheat, and 20 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Some areas of Beecher may be better adapted to permanent pasture, woodland, or wildlife than to crops; or you may prefer to use certain areas for these purposes. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, and either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

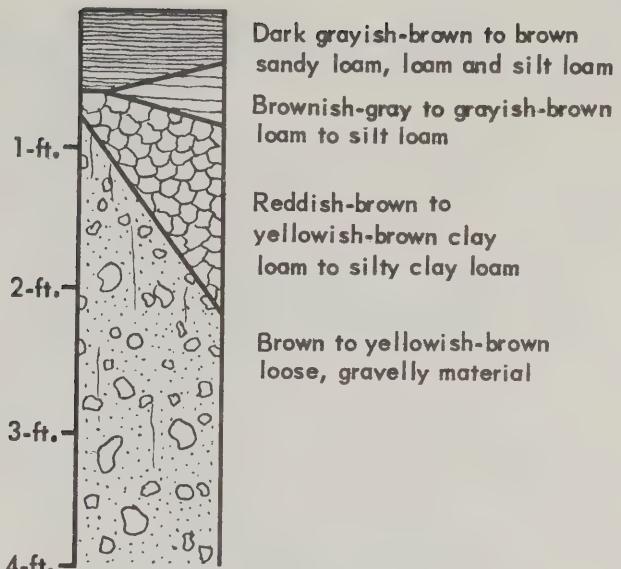
##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect the borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPES:

- 318 LORENZO LOAM TO SILT LOAM
- 318-93 LORENZO - RODMAN COMPLEX
- 318-290 LORENZO - WARSAW COMPLEX
- 323 CASCO LOAM TO SILT LOAM
- 323-93 CASCO - RODMAN COMPLEX
- 323-327 CASCO - FOX COMPLEX
- 362 LORENZO SANDY LOAM

Moderately dark-colored (Lorenzo, Rodman, and Warsaw) to light-colored (Casco and Fox), well to excessively drained soils having silt loam, loam, and sandy loam surfaces with silty clay loam to clay loam subsoils. Most of these soils are underlain with gravelly substrata at a depth of 24 inches or less. Rodman has a 4- to 10-inch gravelly loam surface underlain with gravel rather than a normal subsoil. Warsaw and Fox are deeper soils than the others in this group, with the gravelly substrata occurring at a depth of 24 to 42 inches. Occasionally these soil numbers are followed with the letter (S) which indicates the substrata contains more sand and less gravel than is normal. Because depth to gravel and presence or absence of a subsoil is so variable in areas where these soils are mapped, complexes are necessary to properly characterize some areas. In the complexes Lorenzo or Casco is the dominant soil. These soils occur on gently sloping to steep topography.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Overcoming droughiness, maintaining soil fertility, and controlling erosion are the major agricultural problems on these soils.*

#### Drainage

The soils in this group drain too rapidly because of their gravelly substrata. Frequent rains are needed for best yields. In dry years, all crops suffer and occasionally a complete crop failure occurs.

#### Fertility and Maintenance of Tilth

Under virgin conditions, these soils are neutral to slightly acid, low in available phosphorus, and medium to high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

Sod crops should be plowed under at regular intervals to maintain organic-matter content, provide sufficient nitrogen, and reduce injury due to drough.

The addition of organic matter also helps to maintain favorable tilth. These soils usually have good tilth unless erosion has removed the upper part and exposed some of the underlying gravelly material.

#### Erosion Control

Since the soils in this group are highly permeable, erosion is not severe except on unprotected, steep slopes. However, it is important to prevent erosion because the desirable soil material over the gravel is thin and the loss of it causes irreparable damage. The loss of water by runoff which causes erosion is also serious, since lack of moisture often limits the productivity.

#### Cropping Program and Conservation Practices

Drough resistant crops should be included in the cropping system as much as possible. Also, since these soils need frequent additions of organic matter and nitrogen, a high proportion of legumes and grasses should be grown.

On level land which has no erosion problem and has favorable soil tilth, the most intensive rotation recommended is an R-R-G-M<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-G-M-M rotation is recommended. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

The Most Intensive Crop Rotations Recommended for Soil Types 318, 318-93, 318-290, 323, 323-93, 323-327, and 362  
Occurring on Different Slopes With Varying Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	0,1		R-R-G-M <sub>x</sub>	Erosion control practices not needed			
B	1		R-G-M-M	R-R-G-M <sub>x</sub>	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	2		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
	3		R-G-M-M-M	R-R-G-M-M	R-G-M-M	R-R-G-M <sub>x</sub>	
C	1		R-G-M-M-M-M	R-G-M-M	R-G-M-M	R-R-G-M <sub>x</sub>	
	2		G-M-M-M-M	R-G-M-M	R-G-M-M	R-R-G-M <sub>x</sub>	
	3		G-M-M-M-M	R-G-M-M	R-G-M-M	R-R-G-M-M	
D	1		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	R-G-M-M-M	
	2		G-M-M-M-M	G-M-M-M-M	R-G-M-M-M-M	R-G-M-M-M-M	
	3						
	4						
E	1						
	2						
	3						
	4						
F	1						
	2,3,4						

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; M = hay and rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-G-M-M rotation includes 1 year of row crop, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected under a moderately high level of management on moderately sloping topography are 42 bushels of corn, 29 bushels of oats, 17 bushels of wheat, and 18 bushels of soybeans. Cultivated crops are not adapted on strongly sloping areas.

#### OTHER MANAGEMENT SUGGESTIONS

Some areas of your farm may be better suited for pasture, woodland, or wildlife than for cropland. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is 5 to 7 pounds of alfalfa and 4 to 6 pounds of northern bromegrass per acre. Another is 6 pounds of broadleaf birdsfoot trefoil and either 2 pounds of timothy or 3 pounds of bluegrass per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Adequately stocked, existing stands of desirable species such as bur oak, black oak, white oak, and Northern pin oak will grow up to 250 board feet per acre per year when properly managed.
2. Harvest mature, defective, and less desirable trees unless they are needed to provide vegetative cover.
3. Protect from fire and grazing.
4. Plantations of Austrian pine, jack pine, and red cedar, if properly managed, will produce fence post material in 15 to 20 years and small saw logs in about 40 years.
5. Scotch, red, and white pine may be planted for Christmas trees.

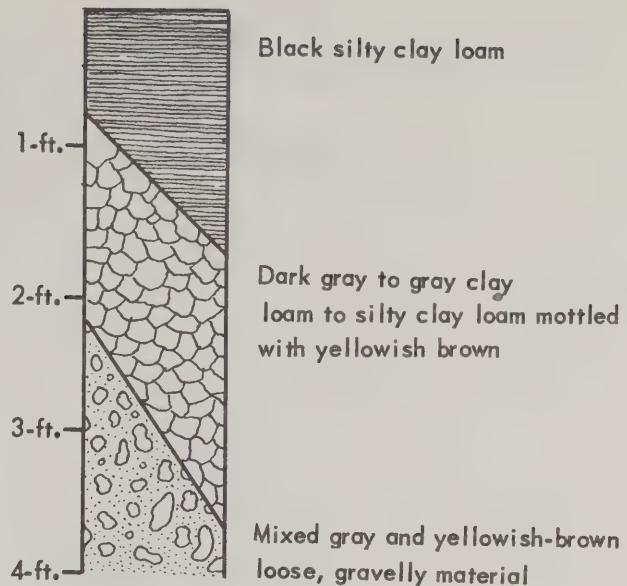
##### Wildlife

1. Develop small wildlife areas by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPE:\*

### 329 WILL SILTY CLAY LOAM

A very dark-colored, poorly drained soil having a silty clay loam surface and a silty clay loam to clay loam subsoil. Will is formed from 24 to 40 inches of medium-textured material underlain with calcareous gravel and occurs on nearly level to depressional topography.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining good tilth are the most important problems on this soil.*

#### Drainage

Providing adequate drainage is a first requirement on this soil. Since the permeability is moderate, tile will function well if adequate outlets are available. Tile lines should be spaced 80 to 120 feet apart if above the gravel; if not, then 120 to 300 feet is recommended. Where the gravel becomes shallow, it may be more practical to use open ditches, but care must be taken not to lower the water table below root depth.

#### Fertility and Maintenance of Tilth

Under virgin conditions, Will is neutral and is variable in available phosphorus and potassium. Your farm adviser can help you plan a sound program of liming and fertilizing on the basis of soil tests, past fertilization, and the cropping system to be used.

Even though Will is naturally high in organic matter, it is desirable to plow under leguminous sod crops at regular intervals. This will not only maintain organic matter and provide nitrogen but will also have the following results: Tilth will be improved; tile will function better; and the subsoil will be more favorable for root development and for good air and water movement.

If this soil is tilled when wet, it tends to become cloddy on the surface and compacted below the plow layer.

#### Erosion Control

Since Will usually occurs on level topography, erosion is not a problem. This soil may show some tendency to erode, however, where it occurs in natural drainageways. If so, sod waterways are advisable.

\* This soil type is included in Land Capability Class

For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## **Cropping Program and Conservation Practices**

On level land which has favorable soil tilth, the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. When this soil occurs on a "B" slope, an R-R-R-G-M rotation is recommended.

The letters have the following meanings: R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

The average crop yields per acre to be expected on level areas under a moderately high level of management are 68 bushels of corn, 50 bushels of oats, 25 bushels of wheat, and 27 bushels of soybeans.

## **OTHER MANAGEMENT SUGGESTIONS**

Although nearly level, productive soils such as Will are generally used for cropland, you may prefer to use limited areas for other purposes. The following recommendations are made for permanent pasture and wildlife.

### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

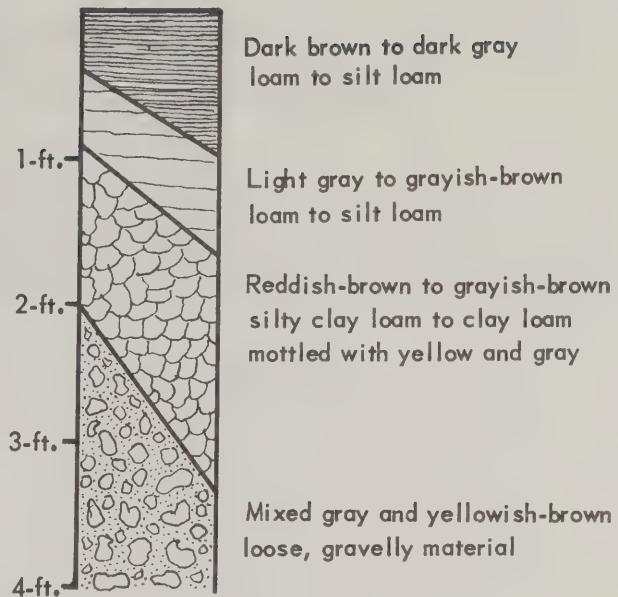
### **Wildlife**

1. When undrained, areas of this soil provide natural cover for wildlife. If the soil is drained, develop small wildlife areas by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multi-flora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:

### 342 MATHERTON SILT LOAM TO LOAM

Moderately dark-colored, imperfectly drained soil having a loam to silt loam surface and a silty clay loam to clay loam subsoil. Matherton is formed from 24 to 40 inches of silt loam to loam material over loose, gravelly outwash and occurs on level to gently rolling topography.



## MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage and maintaining fertility are important problems on this soil.*

### Drainage

Matherton has moderate permeability and tile will function readily. At a depth of 3 feet, tile lines should be spaced 80 to 100 feet apart for adequate drainage. Tile should usually be placed above the gravelly substrata. If the gravel is shallow, open ditches may be more practical.

### Fertility and Maintenance of Tilth

Under virgin conditions, Matherton is slightly acid, medium to low in available phosphorus, and high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

The organic-matter content of Matherton is normally moderately high. For good crop growth, organic matter and nitrogen should be continually added. When a catch crop is used, nitrogen should be added in the form of commercial nitrogen.

Adding organic matter regularly in the form of manure and plowing under legume-grass sod crops will help tile to function properly and maintain favorable tilth and good moisture and air relationships.

### Erosion Control

Erosion is very seldom a problem on this soil.

### Cropping Program and Conservation Practices

A crop rotation should be used that will provide adequate organic matter, control any erosion, and maintain favorable soil tilth. On level land which has favorable soil tilth and no erosion problem, the most intensive rotation recommended is an R-R-G<sub>X</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths of surface are given in the following table.

The Most Intensive Crop Rotation Recommended for Soil Type 342 Occurring on Different Slopes and with Varying  
Depths to Subsoil  
(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, ++, 0, 1		R-R-G <sub>x</sub>	Erosion control practices not needed			
B	+, ++, 0, 1 2		R-R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
C	0, 1 2		R-G-M-M	R-R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
			R-G-M-M-M-M	R-G-M-M	R-R-G-M-M-M	R-R-G-M <sub>x</sub>	
D	0, 1 2		G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M	
			G-M-M-M-M	R-G-M-M-M	R-R-G-M-M-M	R-R-G-M-M-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture; M<sub>x</sub> = portion of meadow is returned by plowing down. For example, an R-G-M-M rotation includes 1 year of row crop, 1 year of small grain, and 2 years of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected on nearly level areas under a moderately high level of management are 58 bushels of corn, 42 bushels of oats, 23 bushels of wheat, and 23 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

Although Matherton is very productive if adequately drained, limited areas may be used for permanent pasture, woodland, or wildlife. The following recommendations apply to such areas.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

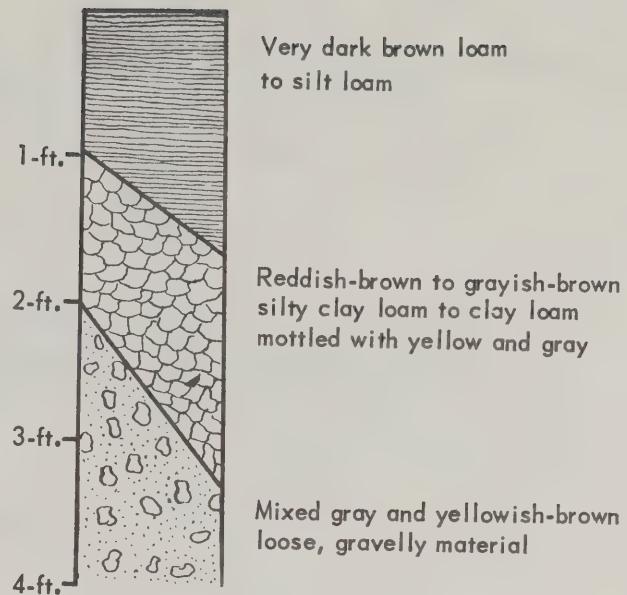
##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

## USE AND MANAGEMENT OF SOIL TYPE:

### 343 KANE SILT LOAM TO LOAM

Dark-colored, imperfectly drained soil having a loam to silt loam surface and a silty clay loam to clay loam subsoil. Kane is formed from 24 to 40 inches of silt loam to loam material over loose, gravelly outwash and occurs on level to gently rolling topography.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*Providing adequate drainage is the major problem on this soil; maintaining fertility should also receive consideration.*

#### Drainage

Kane has moderate permeability and tile will function readily. At a depth of 3 feet, tile lines should be spaced 80 to 100 feet apart for adequate drainage. Tile should usually be placed above the gravelly substrata. If the gravel is shallow, open ditches may be more practical.

#### Fertility and Maintenance of Tilth

Under virgin conditions, Kane is slightly acid, medium to low in available phosphorus, and high in available potassium. Fertilizers should be applied on the basis of soil tests, past fertilization, and the cropping system to be used. Your farm adviser can help you plan a sound program of liming and fertilizing.

The organic-matter content is high. However, for sustained production, either organic or commercial nitrogen should be added regularly. When a catch crop is grown, commercial nitrogen should be used.

Regular additions of organic matter will not only supply nitrogen but will also maintain favorable tilth, help tile to function properly, and maintain good air and moisture relationships.

#### Erosion Control

Erosion is very seldom a problem on this soil.

#### Cropping Program and Conservation Practices

On level land which has favorable tilth and no erosion problem, the most intensive rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable, an R-R-G-M rotation is recommended. Rotations and practices recommended for other slopes and depths of topsoil are given in the following table.

The Most Intensive Rotations Recommended for Soil Type 343 Occurring on Different Slopes and With Varying Depths to Subsoil

(See Part I for meaning of slope group and erosion or depth to subsoil)

Slope group	Erosion or depth to subsoil	Land capability class*	Crop rotations recommended for--				
			No practice	Contouring	Strip cropping	Terracing	
A	+, +, 0, 1		R-R-G <sub>X</sub>	Erosion control practices not needed			
B	+, +, 0, 1 2		R-R-G-M	R-R-R-G-M <sub>X</sub>	R-R-G-M-M-M	R-R-G <sub>X</sub>	
			R-R-G-M	R-R-R-G-M <sub>X</sub>	R-R-G-M-M-M	R-R-G <sub>X</sub>	
C	0, 1		R-R-G-M-M-M	R-R-G-M	R-R-G-M-M-M	R-R-G-M	

\* For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

R = row crop; G = small grain; G<sub>X</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture; M<sub>X</sub> = portion of meadow is returned by plowing down. For example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain, and 1 year of hay or rotation pasture in a 4-year period.

The average crop yields per acre to be expected on nearly level areas under a moderately high level of management are 66 bushels of corn, 50 bushels of oats, 25 bushels of wheat, and 26 bushels of soybeans.

#### OTHER MANAGEMENT SUGGESTIONS

This soil is usually used for cropland. Occasionally, however, permanent pasture, woodland, or wildlife areas may be desired. If so, the following recommendations apply.

##### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

##### Woodland

1. Norway spruce and white pine may be planted for Christmas trees.
2. Protect from fire and grazing.

##### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.

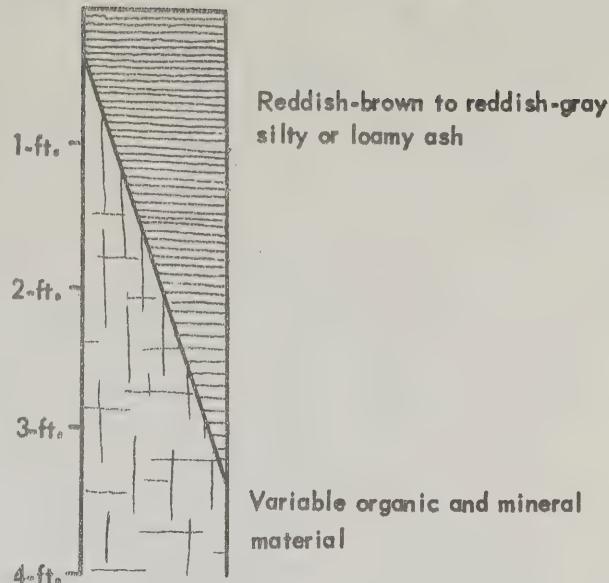
Department of Agronomy, University of Illinois Agricultural Experiment Station  
in cooperation with

Soil Conservation Service, United States Department of Agriculture  
1956

## USE AND MANAGEMENT OF LAND TYPE:<sup>\*</sup>

### 358 LOAMY BURNT MUCK

A very poorly drained land type occurring where peats or mucks have been burned. The surface is a reddish, grayish, ashy material with numerous concretions underlain with unburnt peat, muck, or mineral material.



### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this land type are providing drainage and maintaining tilth and fertility.*

#### Drainage

Pre-existing tile systems and drainage ditches may be destroyed or seriously damaged by burning. New drainage systems may have to be installed for adequate drainage.

#### Fertility and Maintenance of Tilth

The ash is neutral or calcareous depending on the original material. The thickness of the ash varies greatly according to depth of burning and percentage of mineral matter in the material burned.

Where the ash is thin and the underlying soil material is favorable, the soil may be made almost as productive as it was originally. However, areas that have been deeply burned, especially those having large holes and pits, may be of very low agricultural value. This is also true of areas underlain with unfavorable material.

#### Erosion Control

Erosion is not a problem unless the material is extremely dry. Then a small amount of wind erosion may occur unless the soil is protected with vegetative cover.

#### Cropping Program and Conservation Practices

Crops may be grown in areas where only minor burning has occurred and where the texture of the underlying material is favorable. However, no specific rotation is recommended.

Areas deeply burned which have deep holes and pits are best suited for wildlife.

Other areas intermediate between the above conditions, may be better suited for permanent pasture. Each area must be considered individually.

\* This land type is included in Land Capability Class

For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## OTHER MANAGEMENT SUGGESTIONS

For areas suited for permanent pasture or wildlife, the following recommendations apply.

### **Permanent Pasture**

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted grasses and legumes. A suggested mixture is 4 pounds of timothy, 4 pounds of redtop, 2 pounds of alsike clover, and  $\frac{1}{2}$  pound of Ladino clover per acre. Reed canary grass will also provide pasture when sown at a rate of 6 to 8 pounds per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more to go into the winter.

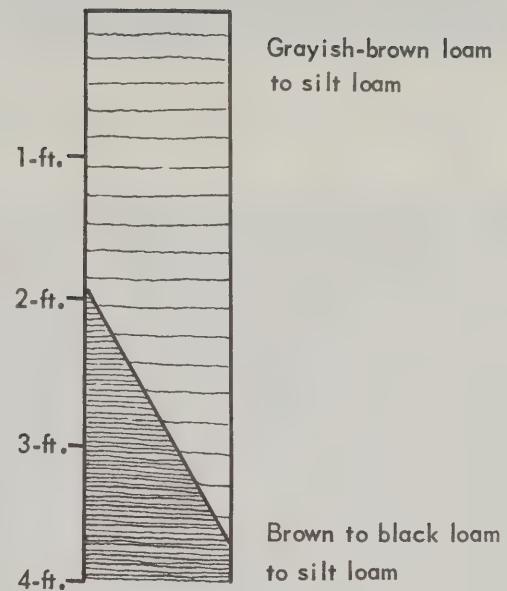
### **Wildlife**

1. Undrained areas provide natural cover for wildlife. Small areas that have been drained can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.

## USE AND MANAGEMENT OF SOIL TYPE:\*

### 364 PISTAKEE SILT LOAM

Light to moderately dark-colored, imperfectly to moderately well-drained soil formed from 24 inches or more of silt loam or loam material that has been washed in from the surrounding slopes and has buried the original soil. Pistakee occurs in depressions and occasionally in small drainageways.



#### MANAGEMENT SUGGESTIONS FOR CROPLAND

*The major problems on this soil are providing adequate drainage and maintaining fertility.*

##### **Drainage**

Drainage is not a serious problem if suitable outlets for the tile are obtainable. Surface inlets to the tile may be desirable to dispose of concentrated runoff.

##### **Fertility and Maintenance of Tilth**

The fertility of this soil is variable depending upon the type of local wash. Soil tests should be made and fertilizers applied as indicated by the tests.

The surface is medium to low in organic matter and nitrogen. Unless these materials are added through the use of manure, crop residues, or commercial nitrogen, crop yields will be below normal. When a catch crop is used, commercial nitrogen should be supplied.

Favorable tilth should be maintained through the use of a good rotation and good farming practices.

##### **Erosion Control**

Erosion is not a problem on Pistakee but the local deposits resulting from erosion of the surrounding soils may be an important problem.

##### **Cropping Program and Conservation Practices**

A crop rotation which includes fibrous-rooted grasses or deep-rooted legumes will add organic matter, improve the tilth, and maintain favorable air and water movement.

On level land which has favorable tilth, the most intensive crop rotation recommended is an R-R-G<sub>x</sub>. When the tilth is considered relatively unfavorable an R-R-G-M or an R-R-M (skip-row planting) rotation is recommended. When this soil occurs on a "B" slope, an R-R-R-G-M rotation is recommended.

The letters have the following meanings: R = row crop; G = small grain; G<sub>x</sub> = leguminous green manure crop seeded in the grain; M = hay or rotation pasture. For example, an R-R-G-M-M rotation includes 2 years of row crops, 1 year of small grain, and 2 years of hay or rotation pasture in a 5-year period.

\* This soil type is included in Land Capability Class  

For an explanation of Land Capability Classes, see your local Soil Conservation Service personnel.

## OTHER MANAGEMENT SUGGESTIONS

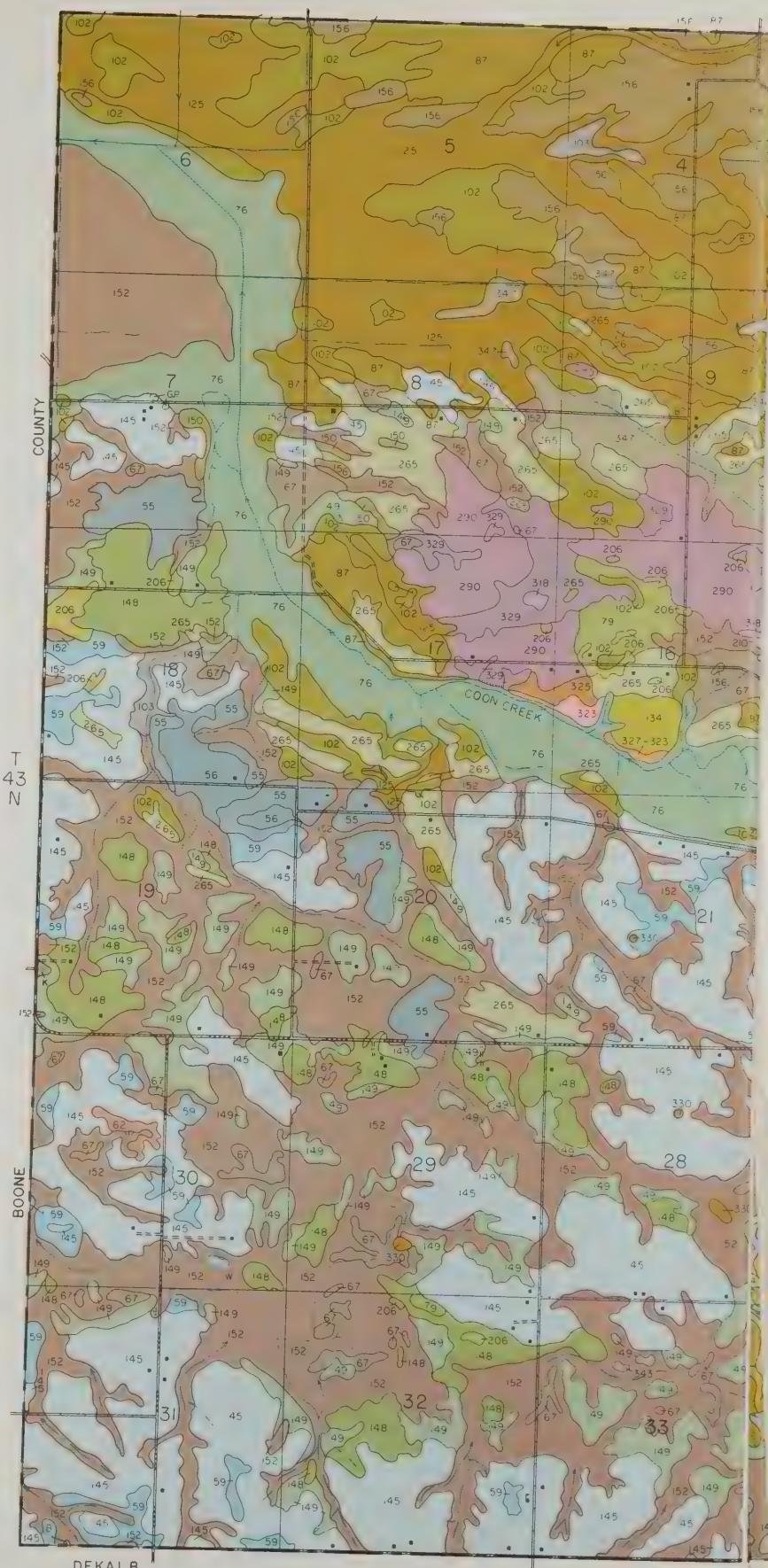
Most of this soil will be used as cropland. Occasionally you may wish to use a small area for permanent pasture or wildlife. The following suggestions apply to such areas.

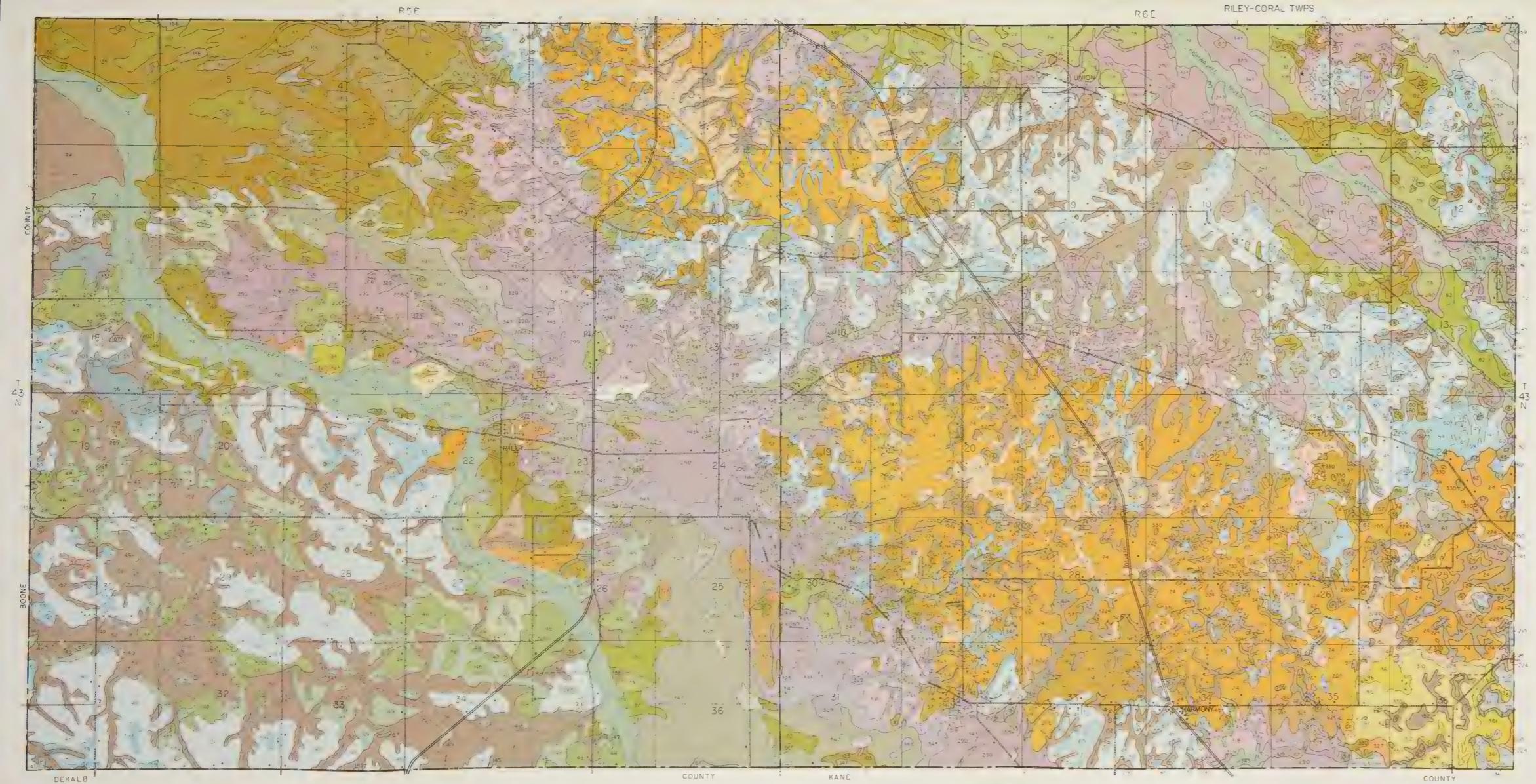
### Permanent Pasture

1. Test soil and correct deficiencies shown by test.
2. Destroy existing sod and prepare seedbed with a plow, field cultivator, disk, or other convenient tillage equipment.
3. Reseed with adapted legumes and grasses. One suggested mixture is  $\frac{1}{2}$  pound of Ladino clover, 4 pounds of northern bromegrass, and 2 pounds of alsike clover per acre. Another is 6 pounds of broadleaf birdsfoot trefoil, either 2 pounds of timothy or 3 pounds of bluegrass, and either 3 pounds of red clover or 2 pounds of alsike clover per acre. Spring seeding should be made early with oats as a nurse crop. Pasture oats when they become 6 to 10 inches tall. In making early fall seeding use winter wheat or rye.
4. Clip to control weeds and promote uniform grazing.
5. Leave a topgrowth of 6 inches or more for winter cover.

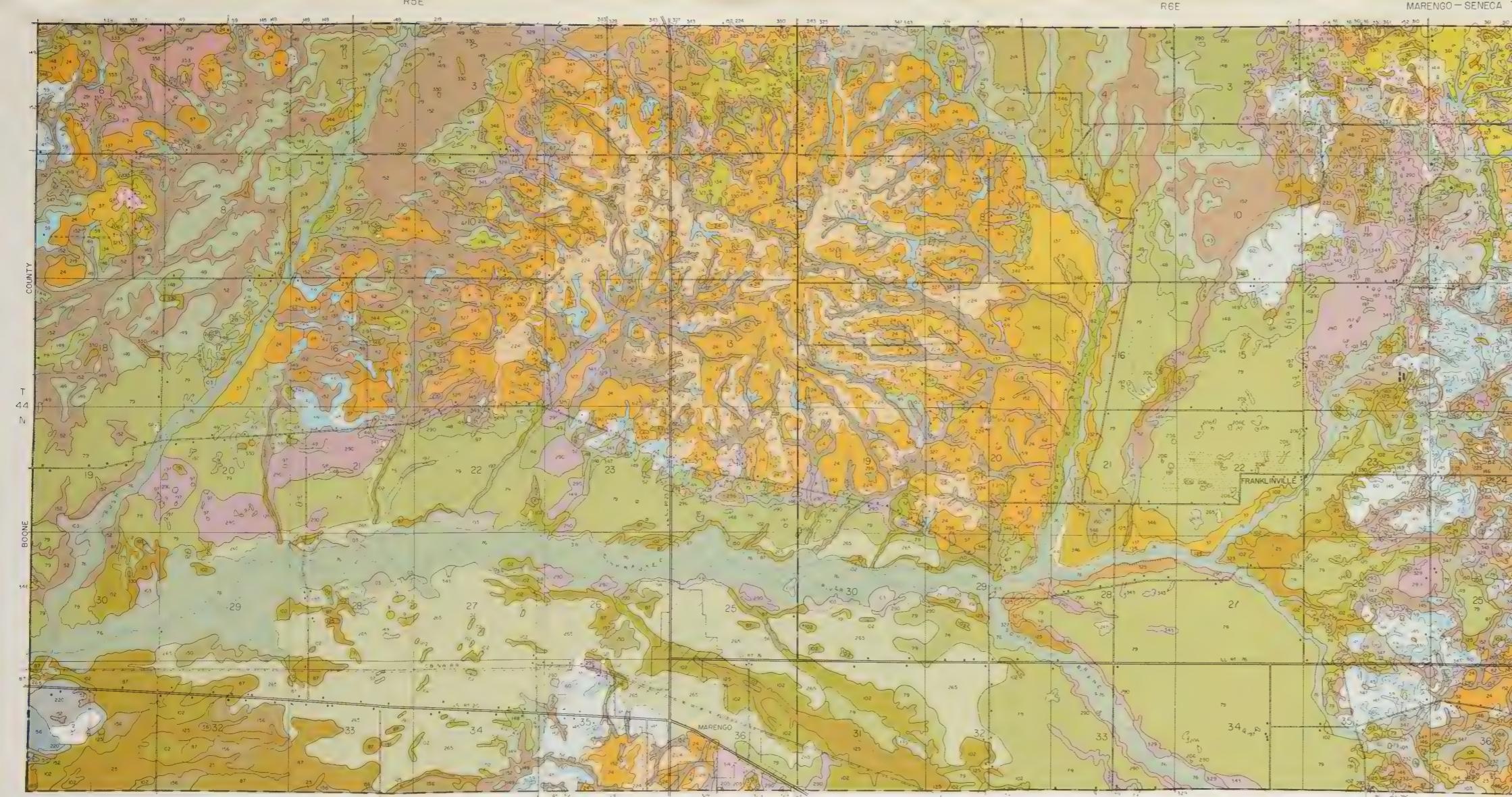
### Wildlife

1. If drained, small areas can be developed for wildlife by planting 100 to 200 adapted conifers per acre in bluegrass and surrounding them with multiflora rose. Fence entire area and protect from grazing and fire.
2. To protect ground-nesting birds and their nests, do not mow field borders until after small-grain harvest.
3. Stock farm ponds of adequate size and depth at a rate of 1,000 bluegills and 100 large mouth bass per acre. Fish pond hard. Protect borders of the pond from fire and grazing.









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UNIV. OF ILLINOIS AGR. EXP. STATION  
SOILS SURVEYED BY: B.W.RAY, IN CHARGE, A.H.REIMER, C.A.SKIMINA, AND P.T.VEALE, UNIVERSITY OF ILLINOIS AGR. EXP. STATION;  
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1955

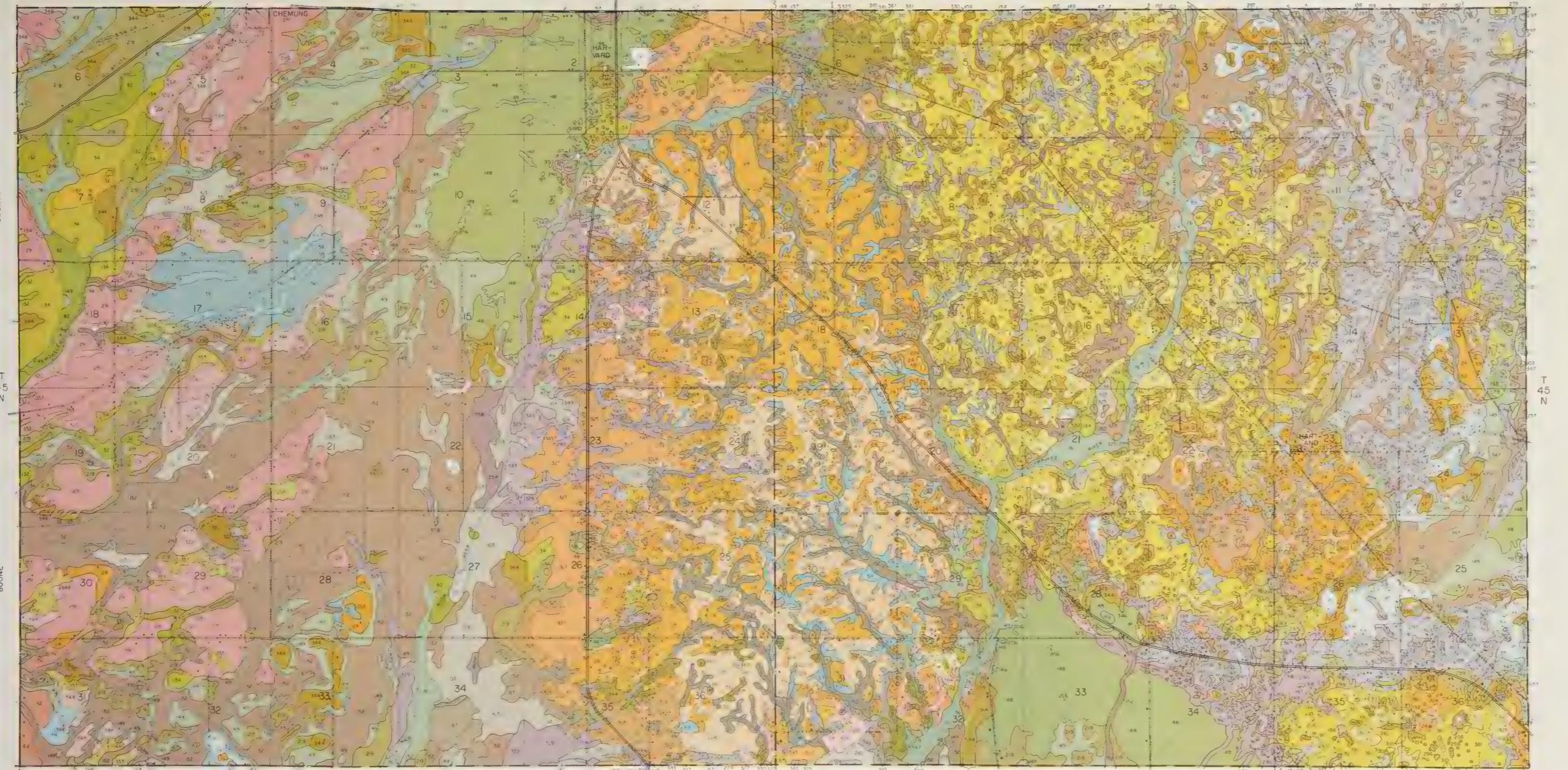
SOIL SURVEY MAP OF McHENRY COUNTY, ILLINOIS



COUNTY

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BOONE



SOIL TYPES	
23	BLOUNT SILT LOAM
103 G	HOUGHTON MUCK
24 H	THORP SILT LOAM
104 P	LENA MUCK
25	VIRGIL SILT LOAM
J	MILLBROOK SILT LOAM
26	HENNEPIN LOAM
125	SELMA LOAM
55	SIDELL SILT LOAM
132	PLATTVILLE SILT LOAM
56	DANA SILT LOAM
134	STARKS SILT LOAM
57	CAMDEN SILT LOAM
137	ELLISON SILT LOAM TO LOAM
59 B	ALVIN SANDY LOAM
144	STRAWN SILT LOAM
60 C	SAYBROOK SILT LOAM
145	ASHKUM SILTY CLAY LOAM
62 D	LA ROSE SILT LOAM
146	ELLIOTT SILT LOAM
67	HARPSTER SILTY CLAY LOAM
148	PROCTOR SILT LOAM
76	OTTER LOAM, BOTTOM
149	BRENTON SILT LOAM
79	VOLINIA SILT LOAM TO LOAM
150	ONARGA SANDY LOAM
82	MILLINGTON LOAM, BOTTOM
152 K	DRUMMER SILTY CLAY LOAM
87	RIDGEVILLE SANDY LOAM
156	WASHTEENAW SILT LOAM
93	RODMAN GRAVELLY LOAM
191 L	KNIGHT SILT LOAM
93-318 E	RODMAN - LORENZO COMPLEX
194	MORLEY SILT LOAM
93-323 F	RODMAN-CASCO COMPLEX
197 M	TROXEL SILT LOAM
97	HOUGHTON PEAT
198	ELBURN SILT LOAM
102	LA HOGUE LOAM
205	METEA SANDY LOAM
206 N	RUSSELL SILT LOAM
210 P	CASCO SILT LOAM TO LOAM
219	DRESDEN SILT LOAM TO LOAM
325	FOX SILT LOAM TO LOAM
327-323 V	FOX-CASCO COMPLEX
329	WILL SILTY CLAY LOAM
330 X	PEOTONE SILTY CLAY LOAM
342	MATHERTON SILT LOAM TO LOAM
343	KANE SILT LOAM TO LOAM
344	HARVARD SILT LOAM
346	DOWAGIAC SILT LOAM TO LOAM
347 Y	HARPSTER SILT LOAM TO LOAM
348	WINGATE SILT LOAM
353	TORONTO SILT LOAM
358	LOAMY BURNED MUCK
361	LAPEER LOAM
363	GRISWOLD LOAM
364 Z	PISTAKEE SILT LOAM

## CONVENTIONAL SYMBOLS

—	PRIMARY PAVED ROAD	TOWN OR DENSELY POPULATED AREA
—	SECONDARY PAVED ROAD	SMALL TOWN
—	GRAVEL ROAD	HOUSE
—	PRIVATE LANE OR DIRT ROAD	SCHOOL
—	RAILROAD, ONE TRACK	CHURCH
—	RAILROAD, TWO OR MORE TRACKS	BUSINESS OR PUBLIC BUILDING
—	ABANDONED RAILROAD	LARGE BUILDING
—	STATE BOUNDARY	CEMETERY
—	COUNTY BOUNDARY	G P O R O
—	TOWNSHIP BOUNDARY	GRAVEL PIT
—	ESCARPMENT	L Q LIMESTONE QUARRY
—	STONY SURFACE	M L MADE LAND AND BORROW PIT

0 1/4 1/2 1 2 MILES

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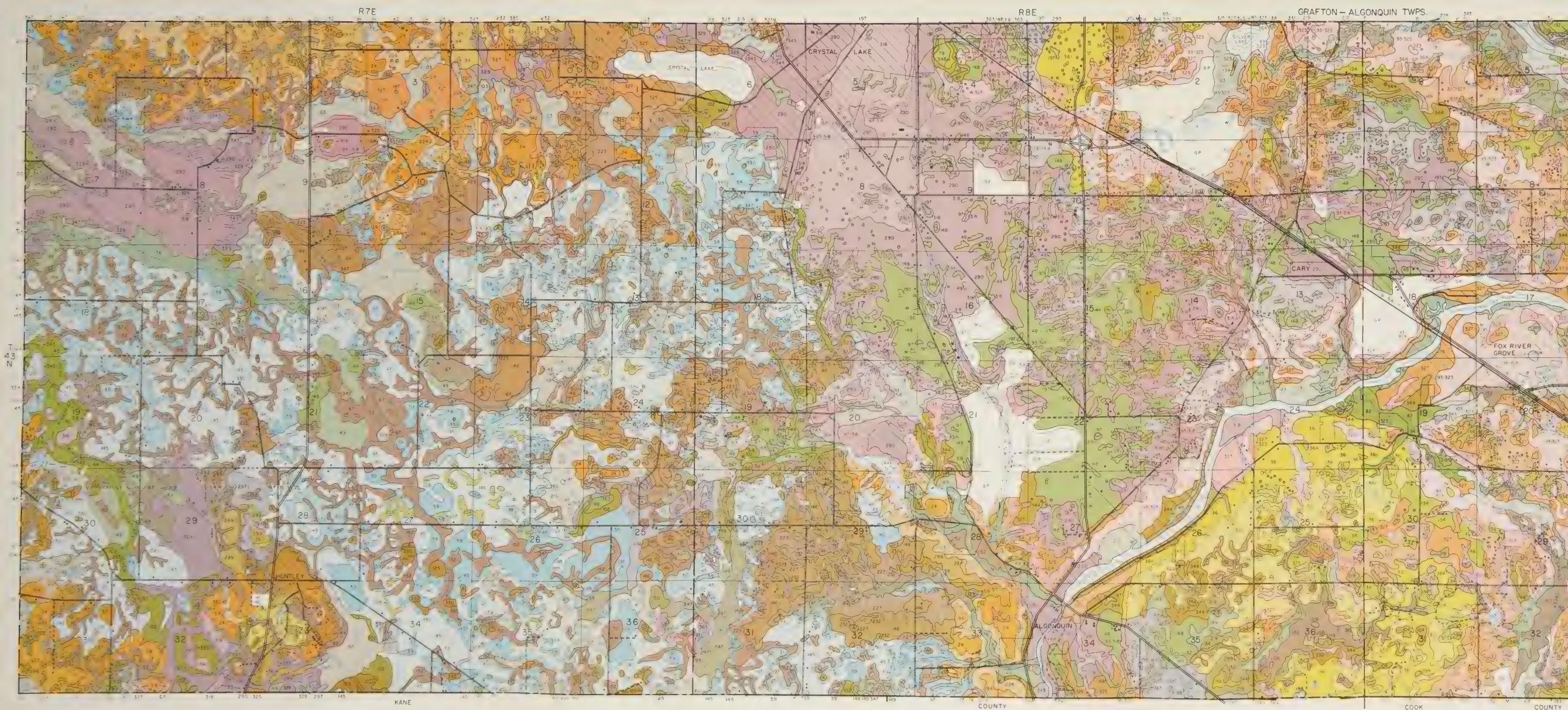
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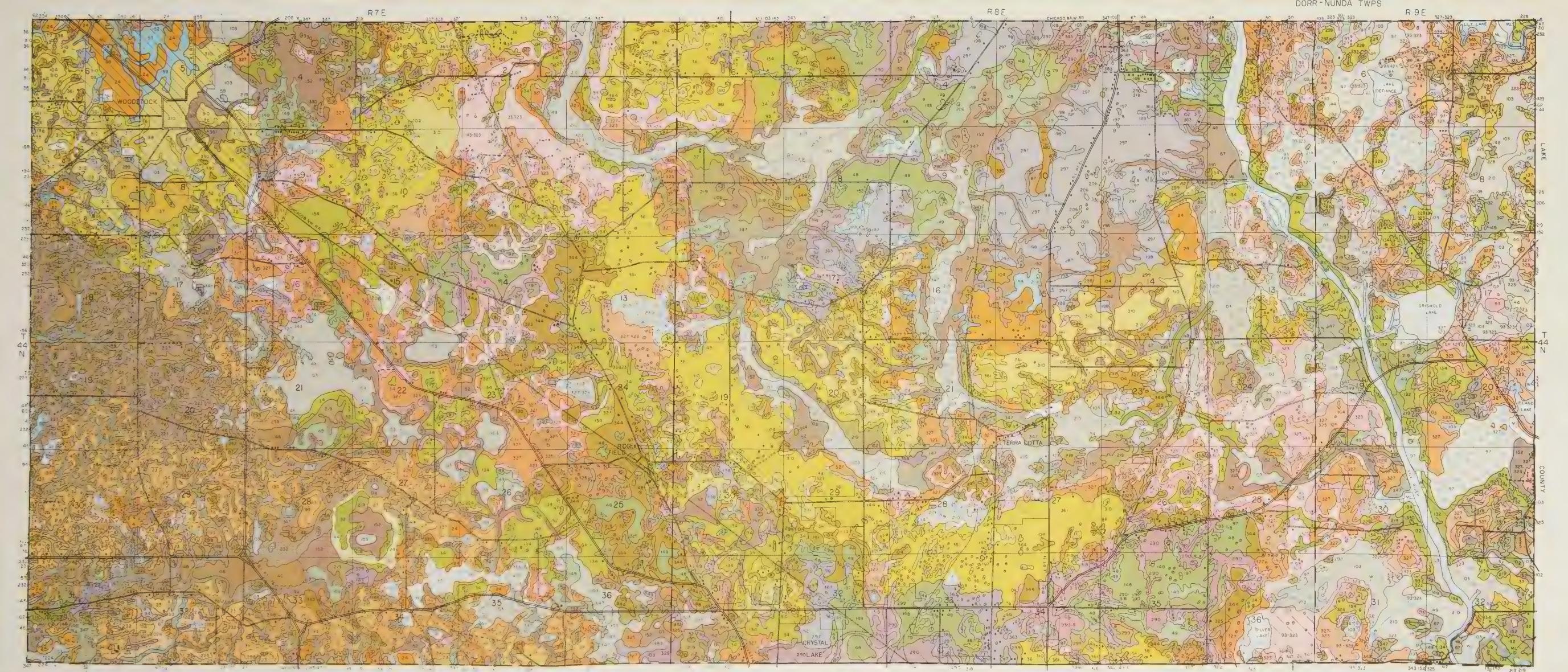
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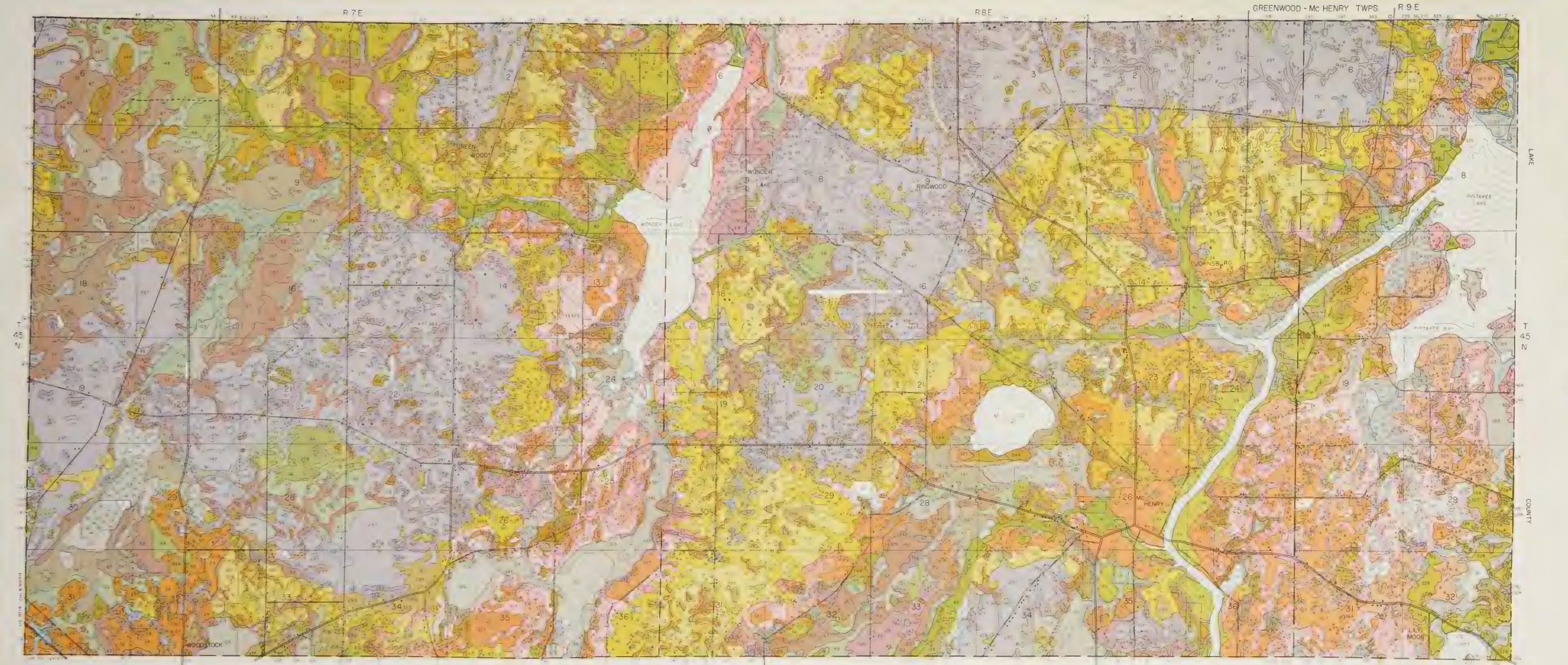
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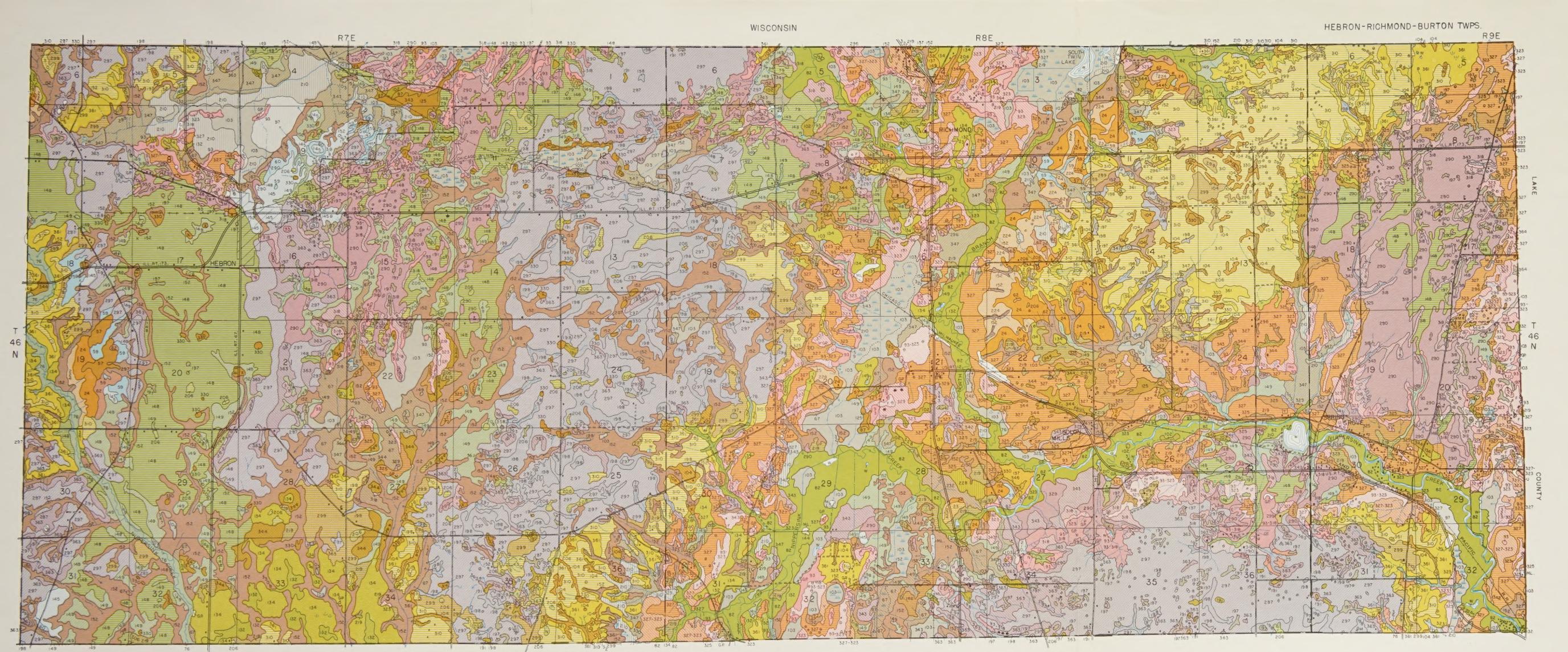






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23 G	BLOUNT SILT LOAM	206 N	THORP SILT LOAM
24 H	MIAMI SILT LOAM	210 P	LENA MUCK
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82	MILLINGTON LOAM, BOTTOM	292 S	WALKILL SILT LOAM
87	SUMNER SANDY LOAM	296	WASHENAW SILT LOAM
93	RODMAN GRAVELLY LOAM	297	RINGWOOD SILT LOAM
93-318 E	RODMAN-LORENZO COMPLEX	298	BEECHER SILT LOAM
93-323 F	RODMAN-CASCO COMPLEX	299	NIPPERSINK SILT LOAM
97	HOUGHTON PEAT	310	McHENRY SILT LOAM
102	LA HOGUE LOAM	318	LORENZO SILT LOAM
205	METEA SANDY LOAM		

CONVENTIONAL SYMBOLS	
—	TOWN OR DENSELY POPULATED AREA
—	SMALL TOWN
—	SWAMPY AREA
—	POD OR LAKE
—	PERMANENT STREAM, RIVER
—	PERMANENT STREAM, SMALL
—	NONCROSSABLE DRAINAGE
—	CROSSABLE DRAINAGE
—	DAM
—	SMALL DEPRESSION
—	AREA OF IRON ACCUMULATION
—	OUTCROPPING SANDY LOAM
—	AND LOAMY GRAVEL MATERIAL
—	SCALE
0	1/4
1/2	1
2 MILES	

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